NEW ZEALAND JOURNAL OF
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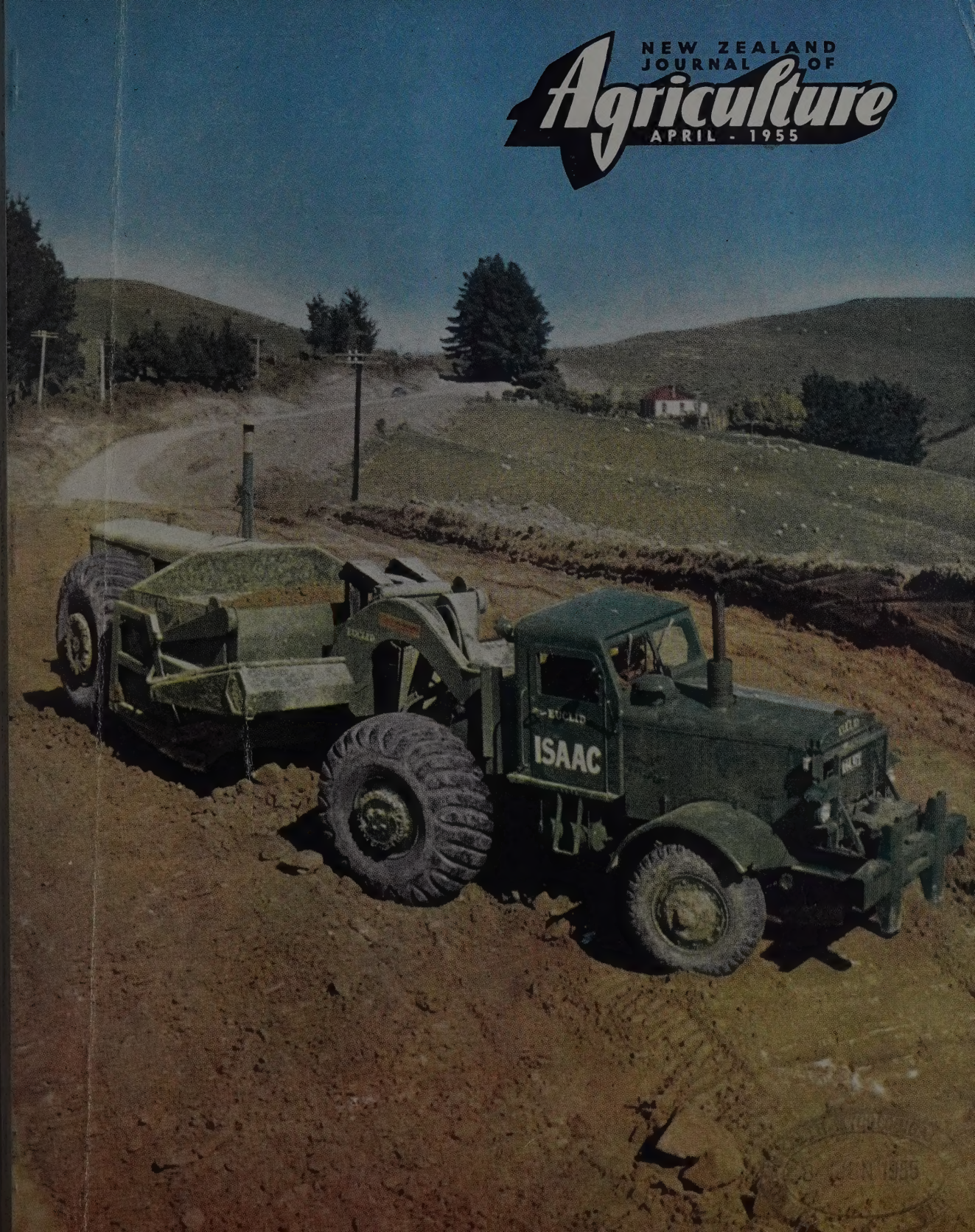

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No. 41 PUBLISHED EVERY SECOND MONTH April, 1955

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1955
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NEW ZEALAND JOURNAL OF Agriculture

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Direction
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Rt. Hon. K. J. Holyoake,
Minister of Agriculture

This Month's Cover

A giant earth-moving machine working on the Christchurch-Picton highway is shown on this month's cover, which has been reproduced from a colour photograph by R. V. Francis Smith. Roads have always been extremely important in the development of land in New Zealand, as a feature of livestock farming is continual movement of animals, both of fat stock from farms to saleyards and meat export works and of store stock from breeding farms to saleyards or direct to fattening areas. In many country districts transport fleets especially adapted to handling all classes of stock have been developed to a high state of efficiency and operate as required even to remote farms.

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REGISTERED AT THE G.P.O., WELLINGTON, AS A MAGAZINE

Farming and Rural Life on the Chatham Islands

THE need to take advantage of all opportunities to expand pastoral production has drawn attention to the potentialities of the Chatham Islands, but so far distance and the irregularity of the shipping service have usually precluded any action being taken. In more recent years, however, the favourable prices for wool have enabled farmers in the Chathams to undertake a fair amount of development work; this in turn has encouraged them to give some serious thought to prospects of future expansion. Among other things they are keenly aware of the need for advice on the most up-to-date aspects of pasture management and animal husbandry. In this article E. A. Madden, Agrostologist, Department of Agriculture, Palmerston North, who has spent some weeks in the islands on four occasions, describes the present state of agriculture and discusses prospects for development.

THE Chatham Islands are a group lying between 43 degrees and 45 degrees south latitude and 176 degrees and 177 degrees west longitude. Chatham Island itself (Wharekauri), the largest, is approximately 31 miles long and 36 miles across. It has an area of 222,300 acres, but the principal lakes and lagoons account for about 49,300 acres. Waitangi, the chief port, is 536 statute miles east of Lyttelton, 480 east-south-east of Wellington, and only 457 from Napier.

Pitt Island, which lies about 15 miles south of the main island and is the only other inhabited one, is about 15,600 acres.

Two small uninhabited islands, Mangere and South East, carry sheep which are tended periodically by their owners, who live on Chatham and Pitt Islands. There are several rocky islets off the coasts.

The islands are included in the Eastern Hemisphere by the international date line and so are 45 minutes ahead of New Zealand time, instead of nearly a day behind as they would have been if it were not for the deviation of the international date line to include them in the Eastern Hemisphere.

History of Settlement

There are many gaps in the historical records of the Chatham Islands and unfortunately the legends and versions of history do not all coincide. Some estimates suggest that when the islands were discovered more than 150 years ago they were inhabited by between 1000 and 2000 Morioris. The number dwindled through the people contracting European diseases from traders and whalers, and an invasion and subsequent settlement by Maoris in the 1830s accounted for a further decline in the Moriori population. The last full-blooded member of the race died in 1933.

Mission stations were set up in the early 1840s and thereafter the raising of horses, cattle, and sheep became well established. Grain and potatoes were grown and shipped to New Zealand and Australia and trading vessels obtained supplies at the islands.

An increased demand for horses and cattle in New Zealand and Australia

HEADING PHOTOGRAPH: Waitangi (Chatham Islands) from above the wharf access road, showing sea erosion along the waterfront and 50ft. cliff behind. From the foreground along the beach are the Centennial Hall, council office, courthouse, post office, and Mangoutu Hotel. Above, on the hill, are the general store (formerly the Travellers' Rest Hotel), the hospital, and the Roman Catholic Church. National Publicity photo.

during the gold rushes temporarily boosted progress. Settlement was spasmodic owing to problems associated with land acquisition by would-be colonisers, but when some of these matters were settled land development proceeded.

Though Admiralty charts were in existence years before, an official survey of the whole island group was not completed until 1883.

Many of the Maoris having an interest in the land of the Chathams are living in New Zealand and it is difficult to secure sufficient measure of agreement to go ahead with any consolidation schemes. Some properties are being farmed by descendants of the original owners; others are managed for estate trustees or absentee owners. Returned servicemen from the Second World War have been settled on four farms.

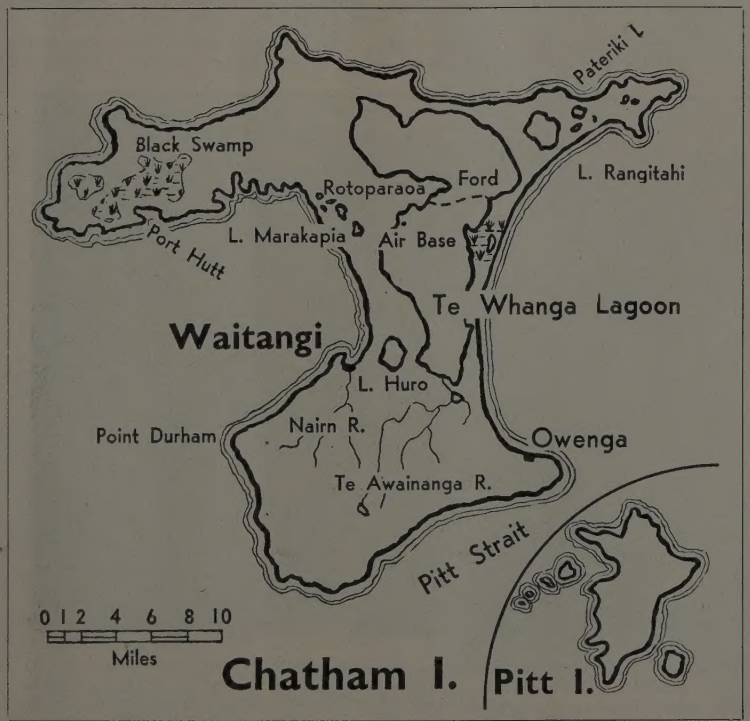
The present population of nearly 500 consists of Maoris, Europeans, and people of mixed blood. The people appear rather reserved, but their friendly nature soon becomes apparent to those who wish to fraternise with them.

The strategic location of the Chatham Islands was indicated in the Second World War by the sinking of the steamer Holmwood, shortly after she sailed from the Chatham Islands, by the German raider Komet.

The landing jetty at the air base, Te Whanga Lagoon. "Plane day" (and "Boat day" at Waitangi) are notable events, when numbers of the settlers meet to chat, greet friends, and collect mail and stores. Ice cream for children and sausages for the family are delicacies which are dispensed on these rare and important occasions.

Original Vegetation

At the time of their discovery the islands are reputed to have been densely forested right to the sea except for extensive areas of peat, many of which were on fire (1). The principal trees were kopi or New Zealand karaka (*Corynocarpus laevigata*), karamu (*Coprosma foetidissima*), matipo (*Suttonia chathamica*), and akeake (*Olearia traversi*), not New Zealand akeake. Peat lands, known locally as "clears", support many minor weeds, mosses, sundews, and a few ferns, but little else. Their extent is described by Allan (2), who said: "Peat swamps are in fact so general that they are a hindrance to geological investigation".



Early visiting botanists found the indigenous and endemic flora of distinct interest. Among the latter are akeake, a tree which provides excellent fencing timber; Chatham Island lily (*Myosotidium nobile*), which is really a giant forget-me-not; Chatham Island thistle (*Sonchus grandifolius*); terahina (*Dracophyllum arboreum*), a tree bearing both juvenile and adult leaves on adjacent shoots; and flax (*Phormium tenax*), which though apparently identical with the fibre-producing plant of New Zealand, is devoid of strong, useful fibre.

Remnants of native forests exist in numerous isolated patches, but it is only at the southern end of the main island, which is steep, hilly, and dissected by gorges, that appreciable areas of natural forest exist.

As rimu, totara, and matai did not grow on the island, all such building timber has been imported.

Climate

At Waitangi the average annual rainfall is approximately 35in.; it is somewhat lower at the northern end of the island and probably higher at the southern end. Though rainfall is heavier in winter and spring, it is reasonably well distributed throughout the year. The climate is a mild, insular one; frosts are rare and pastures continue to grow most of the year.

When cold south-west winds are persistent pasture growth is retarded, but it recovers fairly soon after a change of wind.

The south-west parts of the island, where the elevation is greatest, are most seriously affected by cold winds. Most trees along the southern and western coasts and in exposed positions inland are misshapen owing to the strong south-west winds. This has created an erroneous impression about the winds. Probably there is no true prevailing wind, but the wind from the south-west blows with more force than it does from other directions. The island skies are frequently cloudy during the day. Northern districts, especially toward the eastern end of the island, are little above sea level and enjoy an excellent pastoral farming climate.

The low altitude of most of the country and its proximity to the coast combined with the large areas of lagoon and lakes are the prime factors that make the climate relatively mild. Though summer temperatures are too low for the early ripening of many crops, there are some productive and attractive vegetable and flower gardens. In many respects the climate and growing conditions resemble those of the west coast of the southern part of the North Island of New Zealand.

Topography

Most of the northern part of the island is flat and gently rolling, apart from a few small, well-defined, and more or less conical hills, only two of which exceed 500ft. elevation. Land at the southern end is more elevated and two survey trig stations there are more than 900ft. above sea level. The land mass south of Waitangi is hilly and somewhat steep in places. The numerous lakes and lagoons are all near sea level. Te Whanga lagoon near the middle of the island is 45,700 acres. At intervals of several years it breaks through a sand and shell bank at its south-eastern end and through the channel then formed it may be tidal for many months.

Several small streams, especially in the more rugged southern area, flow into the sea; others flow into lakes and lagoons. There are only two rivers of any size, the Nairn, which discharges into the sea at Waitangi, and the Te Awainanga, which flows into the big Te Whanga lagoon.

Land Types

As no soil survey of Chatham Islands has been made, the land has been tentatively classified into the following main general groups:—

1. **Lands of volcanic origin:** These comprise reddish-brown clays and granular loams. They predominate on the coastal regions around Waitangi and to the south and also to a limited extent in the north. This land is fairly fertile, easily worked, and prone to dry out in summer, but it becomes extremely puggy and sticky in winter. It is gently undulating and hilly.

2. **Silty-clay country:** In general this has a dark surface soil overlying light yellowish subsoils and is common on some of the undulating and hilly country. The depth and colour of the topsoil vary according to altitude and slope. Deficiencies of plant nutrients are indicated by its vegetation and rather poor pastures. Natural drainage is reasonably good.

3. **Consolidated sand country:** Of the two distinct classes within this group one is well drained and the other remains wet. The latter invariably is well leached and frequently overlies an ironstone pan. Consolidated sands may be either flat or undulating and are usually near the coast. Neither class is very fertile. Natural vegetation consists of fern and small shrubs, but there are fair-quality pastures on some areas which have been cleared and sown.

4. **Unconsolidated sands:** In most of the west coast country north of Waitangi, on the northern coastal belt, and along a considerable length of the east coast there are almost continuous fringes of unconsolidated sand dunes which, through the discriminate planting and natural spread of marram grass (*Ammophila arenaria*), are fairly stable. Parts of this coastal belt where a variety of herbs and shrubs is spreading among marram are used for run-off grazing.

5. **Peat land:** Extensive areas of peat, often many feet deep, exist from near sea level to the top of some high inland country. Peat country, which is usually wet, is locally referred to as "clears", apparently because it was clear or free from trees and forest when the Chathams were discovered. Despite the decided slopes, which appear to be far too steep to hold water, bogs occur irregularly on the "clears". Undoubtedly the boggy peat land can be attributed to the growth of sphagnum over past centuries.

The "clears" are more boggy at the top of sloping ground than lower down

Left—The main highway between Waitangi and Owenga. Farming has not progressed as rapidly as it might have done and an essential step toward closer settlement and higher production is the building of many miles of metalled roads. Right—In places the nature of the ground has forced the abandonment of surveyed roads and traffic goes willy-nilly as surface conditions permit.

and if one dares to traverse them, even in the summer, it is fairly certain that an impassable boggy patch will be encountered. Whereas most uninitiated riders or drivers would seek a firmer crossing higher up the slope, experienced Chatham Islanders move downhill some distance before risking a second attempt at crossing such deceptive surfaces. Consolidated peats or those which have been burnt support fair pastures and appear to have distinct potentialities as farmlands.

6. **Peaty sands:** These comprise a complex series. Some are well drained and others, regardless of the fact that they may be on sloping ground, are almost perpetually wet. The proportion of peat to sand varies considerably and is a prime factor affecting moisture retention and drainage. Though peaty sands are of low fertility, they respond to treatment and are easily worked. They are derived from the deposition of wind-borne sand which through the centuries has blended with the developing peat.

7. **Limestone country:** Land derived primarily from limestone exists in several regions, but its extent has not been ascertained. Some of it supports good pastures and probably it would all do so if properly farmed.

8. **Intermediate types:** These result from admixtures of those already mentioned.

Trials show that pastures on most types of land respond to phosphatic fertiliser and that the use of lime promises to be profitable.

Certain stock ailments in a few localities are known to be due to deficiencies of copper and cobalt. No doubt there are other mineral deficiencies, but until a soil survey has been made and the soils have been analysed pasture and stock problems must be solved by experiment.

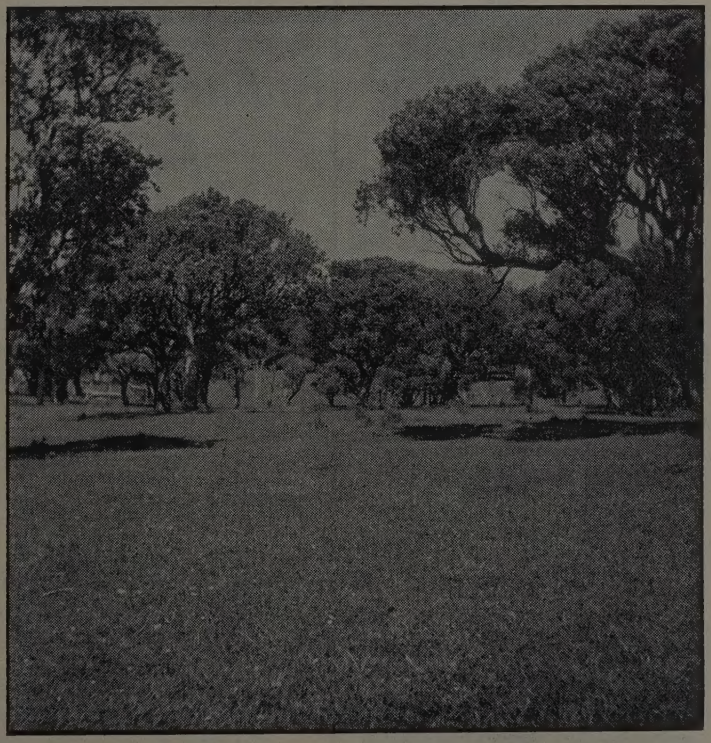
Chatham Islands soils are markedly deficient in nitrogen. The effect of stock urine in promoting grass growth is striking and proof of the lack of nitrogen. Additional evidence of this was obtained by applying sulphate of ammonia to plots on several farms. Nitrogen deficiency can be overcome best and most economically by increasing the clover content of the pastures and by good grazing management.

Farming

Farming is strictly pastoral, fairly intensive on good land, but the reverse on poor land. The latter is held mainly in large blocks (from 10,000 to 20,000 acres) and may carry 1 sheep to 3 or 4 acres, in contrast with the best land, which does better than 4 sheep to the acre.

Sheep farming is the main source of income and is likely to be for years to come. Various breeds of sheep have been tried during the period of settlement, but Romney blood predominates today. Stud rams are imported regularly from New Zealand. Good-quality wool is produced and sheep shipped

Typical farmland reasonably well subdivided and with fair-quality pastures.



Some grazing land is well sheltered, but vast areas are devoid of trees.

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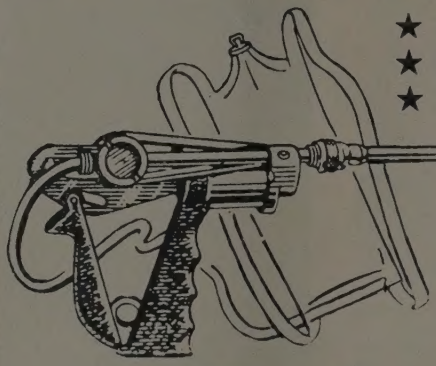

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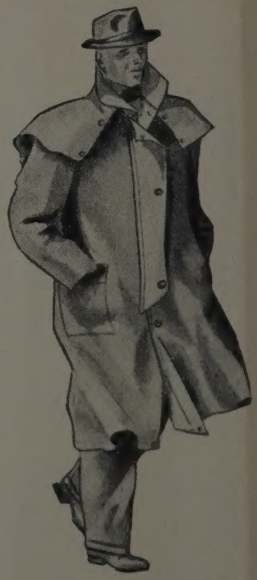

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A fine old home near Waitangi, Chatham Islands. [*National Publicity*

to New Zealand and sold at Addington fetch good prices, thus indicating that they are a desirable type. Lambing percentages average somewhat under 80 per cent.

There has been a steady increase for some years in total sheep carried, the number shipped from the island, and the amount of wool produced, but potential production is far in excess of what it is at present. In most respects farm life and work differ little from that of sheep farmers in the back country of New Zealand. Chatham Island farmers have no ragwort (*Senecio jacobaea*), broom (*Cytisus scoparius*), tauhinu (*Cassinia leptophylla*), hard fern (*Paesia scaberula*), or manuka (*Leptospermum scoparium*) to worry about. One small plantation of manuka exists and further reference to it is made in the section dealing with weeds.

In an unpublished departmental report (April 1951) A. G. Brash and A. Forrester, Veterinarian and Principal Inspector respectively of the Department of Agriculture, Christchurch, indicated that though stock health generally was fairly good, it might be improved by better pasture management and by maintaining a higher and more uniform level of feeding.

For several decades cattle were tolerated only for their use as implements to control fern and scrub and consequently a large-boned, long-horned, nondescript type developed, but since the increased demand for beef has made cattle raising more attractive a marked improvement has been achieved by using imported Polled Angus bulls. This change has not been accomplished easily, and periodically farmers have to wage war on wild mongrel bulls. Wild cattle have little respect for fences and on large stations where native bush provides adequate shelter the destruction of all unwanted bulls will take time. This problem does not exist on more intensively farmed properties, where most of the store cattle for export are raised.

The closing of a small cheese factory at Te One about 16 years ago marked the end of the dairying industry on the island. Diminishing supplies of milk, increased operating costs, and the inadequacy of seasonal labour forced the proprietors to cease manufacturing cheese. The dairy farmers had no alternative to disposal of their herds and adoption of sheep farming. Nevertheless there are still about 100 dairy cows on the island and milk and cream are plentiful on most farms. Though a fair amount of butter is made on some farms, large quantities are imported from New Zealand.

Cropping was more widely practised in former years than it is today. Supplementary feed is provided to a limited extent by turnips, swedes, chou moellier, and cereals, but little hay is made. A small paddock of lucerne on one farm indicates that it might be grown profitably on many others. Most farms are fairly well watered by streams or lagoons.

Pastures

From what early botanists wrote it seems that there were only a few native and endemic grasses on the island and as the country was densely forested, except on the inhospitable peats, it is presumed that grasses were rare, both in number of plants and species, at the time of exploration.

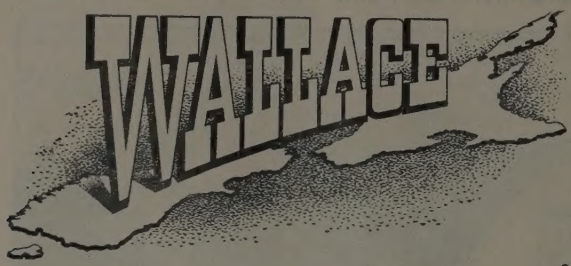
Today the position is quite different. Forests have been cleared and in their places pastures composed largely of exotic species dominate the landscape. Probably the first importations of grass and clover seeds were made from England, Europe, Victoria, or Tasmania in the early years of settlement, but there seems to be no authentic record of the first attempts to establish pastures on Chatham Island. Perhaps the first occurred at mission stations after the forests had been felled and burnt.

Some of the old residents assert that thousands of acres of forest land were cleared and never sown in grass. It was soon learnt that when the bush was felled and the light reached the ground grasses established readily without sowing of seed. Felled trees, mainly softwoods, rotted quickly and burning was not the regular practice as it was in New Zealand.

Pastures Types

There is a wide variety of pasture types, which range from comparatively simple associations to quite complex ones.

First, there are those composed predominantly of ryegrass (*Lolium perenne*), crested dogstail (*Cynosurus*



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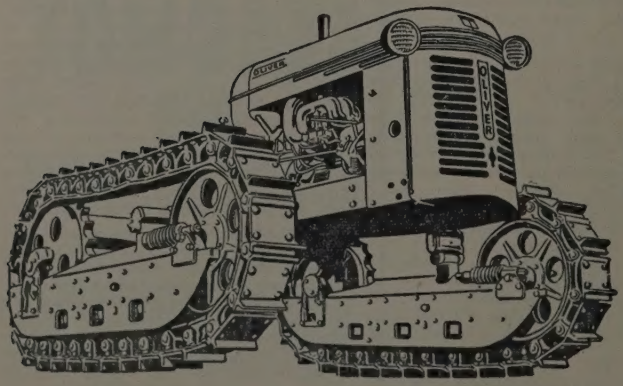

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cristatus), cocksfoot (*Dactylis glomerata*), white clover (*Trifolium repens*), suckling clover (*T. dubium*), *Poa pratensis*, and *Poa trivialis*, a combination that is characteristic of some of the fairly fertile land, where the carrying capacity may be in excess of 4 sheep per acre.

Secondly, there are poorer types, which are common on the dry or sloping country, usually composed mainly of danthonia (*Danthonia* spp.), sweet vernal (*Anthoxanthum odoratum*), crested dogstail, hairgrass (*Vulpia* spp.), and English trefoil (*Medicago lupulina*).

A third major association, which is prevalent on moist soils, consists mainly of Yorkshire fog (*Holcus lanatus*), browntop (*Agrostis tenuis*), sweet vernal, and suckling clover.

The presence in the pasture of more species than those enumerated indicates that complex seed mixtures were sown in former times. For instance, timothy (*Phleum pratense*), meadow foxtail (*Alopecurus pratensis*), red top (*Agrostis palustris*), prairie grass (*Bromus carthaticus*), chewings fescue (*Festuca rubra* var. *fallax*), and yarrow (*Achillea millefolium*) are widely distributed, though not necessarily common. No doubt many of the less useful grasses arrived as impurities in grass seed mixtures and to this could be attributed the presence of goosegrass (*Bromus hordeaceus*), *Poa annua*, old-man couch (twitch) (*Agropyron repens*), creeping bent (*Agrostis stolonifera*), floating sweetgrass (*Glyceria fluitans*), hairgrass (*Vulpia* spp.), English hairgass (*Aira* spp.), burr clover (*Medicago hispida*), spotted burr clover (*M. arabica*), strawberry clover (*Trifolium fragiferum*), melilot (*Melilotus indicus*), falcatula (*Falcatula ornithopodioides*), and floating foxtail (*Alopecurus geniculatus*).

Native grasses, namely plume grass (*Dichelachne crinata*), wind grass (*Deyeuxia forsteri*), sand bent (*D. billardieri*), oat bent (*D. avenoides*), and New Zealand rice grass (*Microlaena stipoides*), are widespread, but more or less rare, except in poor, dry places.

Barley grass (*Hordeum murinum*) is common and widespread, ratstail (*Sporobolus capensis*) has not been introduced, and the only tall fescue (*Festuca arundinacea*) plants seen on the island were in an old lawn. Weedy pastures are common, the weeds being almost solely exotic.

In more recent years *Lotus major* and subterranean clover (*Trifolium subterraneum*) have been established experimentally in a few localities and have proved their value as pasture plants. Odd plants of paspalum (*Paspalum dilatatum*) on roadsides suggest its probable value in permanent pastures.

Winter production is the critical factor limiting carrying capacity. Though supplementary crops for winter feed were grown frequently, no attempt was usually made to resow pastures after the crops had been eaten off. Reliance was placed on the natural or volunteer establishment of a sward and this probably explains why some lowland pastures are inferior to those on adjacent higher country. Good and poor pastures on opposite sides of straight fencelines reveal the effect of management practices rather than differences in soil type.

Face of lime quarry where the deposit consists of powdered and granular lime of good quality. It is available at a royalty of 1s. per ton and does not need crushing.

It is noteworthy that cocksfoot and ryegrass have persisted in some of the oldest pastures despite almost continuous grazing by sheep. This may be attributed to the origin of the seed sown at mission stations. The size of the cocksfoot plants in some regions suggests that a special type or strain has been evolved and investigations into its productivity and persistence are being undertaken.

White clover in these old pastures is the small-leaf, low-growing type similar to Kentish wild white, from which it probably originated. Owing to lack of bees on the island until recently little pollination occurred, so it is unlikely that the clover is the short-lived type of Dutch origin.

By and large the pastures on the island are not of high quality and the best are on good land which is more or less intensively farmed. On vast tracts of undeveloped or partially developed country which are run on extensive grazing lines pastures are even poorer. Nevertheless, according to the report of the Department of Island Territories of March 1953, 127,000 sheep, 5000 run cattle, 100 dairy cows, and 400 horses are carried on 95 farm holdings and the exports are shown as 26,293 sheep, 202 cattle, and 2895 bales of wool. Unquestionably carrying capacity and production can be substantially increased, but many changes must be effected to achieve this.

Orchards and Gardens

Some very old home orchards are relatively productive despite lack of regular pruning and spraying. Diseases and insect pests are uncommon, owing probably to the initial importation of clean plants and to their isolation. If disease-free and insect-free trees and plants are imported in future, both old and new orchards should remain clean and not require much spraying. There is a need for more fruit trees and unsatisfactory land tenure is probably the reason why expense in establishing them is regarded as unjustifiable on some properties. Small fruits and berries grow satisfactorily and more plantations should be established.

Some vegetable and flower gardens are of good standard and indicate what could be done by almost anyone with an inclination for gardening. There are adequate supplies of sheep manure to keep garden soils highly fertile and the growing of more vegetables should be encouraged.

Beekeeping

Endeavours to establish colonies of honey bees on the island in former years were unsuccessful. There is no evidence that American foul-brood was present. As no specific reasons for failures could be ascertained, it is presumed that lack of food, strong winds, inadequate shelter, and lack of experience all contributed to the failures which led farmers to the conclusion that further attempts were unwarranted.

Having realised that the absence of seeds in clover flower heads is due to the absence of bees and that the production of clover seed is desirable, several farmers recently procured hives of bees from New Zealand and already a fair quantity of high-grade honey has been produced and most clover flower heads within reasonable distances of hives were found to contain seeds. The renewed interest in beekeeping should aid pasture improvement.

Trees, Timber, Woodlots, Shelter

Though the land is by no means devoid of trees, there are large tracts of country on which tree planting would be beneficial. The island, except for the "clears", was once densely forested, but timber is now scarce. Pines, macrocarpas, and eucalypts are growing well in several plantations, the oldest of which have already provided useful timber. Invariably plantations are on freehold land, but the cost of young trees and double fencing is a deterrent to the planting of shelter belts and woodlots, especially on leasehold land. Timber will always be needed and plantations which provide both shelter and timber will be invaluable.

Industries and Employment

Though the fishing industry has been established for many years and about 400 tons of fish are shipped to New Zealand annually, the number of people employed solely in this industry is very small.

A proposal to establish a *Phormium* flax industry on the island was investigated by the writer in 1953, but present and future circumstances were not considered to warrant recommendation of support for the proposal.

Full employment is enjoyed by all and usually there is a slight scarcity of labour. The people are versatile, but building tradesmen would be welcomed and assured of regular employment for a long time.

Until more agricultural workers are available progress in intensive farming and in the breaking in of new land will be slow.

Education

There are three primary schools, at Te One, Te Kairakau, and Owenga respectively. The first two are served by school buses.

In some of the remote regions advantage is taken of the facilities provided for both primary and post-primary tuition by the Correspondence School of the New Zealand Department of Education, but the irregular and infrequent mail service is a handicap to steady progress.

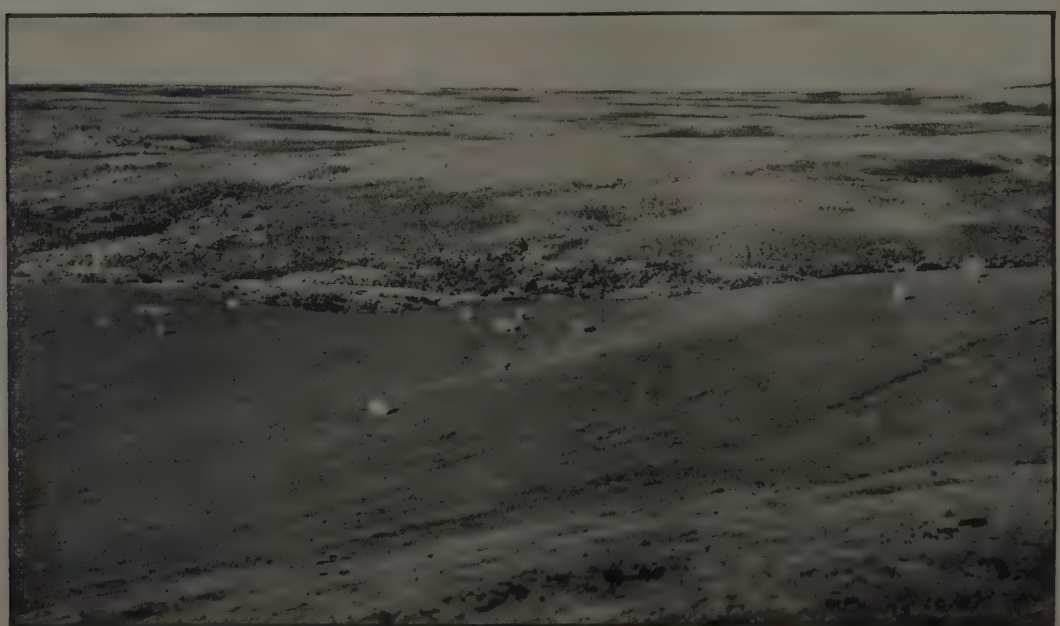
A few of the more fortunate children attend secondary schools in New Zealand and enjoy the advantages of higher education and associating with others of their own age. Such experience is invaluable for children, but it has an unsettling effect on them when they return to the island. To overcome this a local district high school, with a bias to agriculture, is essential.

Shipping

Though a wharf at Waitangi facilitates the direct loading and unloading of boats, it is apparent that cargo handling could be improved. Until the wharf was built all freight was moved between shore and ship in small boats and it still is at a few places on the northern end of the island and always at Pitt Island.

Boat trips at intervals varying from 10 to 20 days for part of the year meet present needs and enable all wool and surplus stock to be shipped to New Zealand. No better service can be justified at present, but undoubtedly it will be augmented as occasion demands. Freight charges at 12s. 6d. per head for sheep, from £7 to £9 per head for cattle, and over £9 per ton on general cargo add to farming costs. The irregularity of the shipping and the fact that during winter there may be no boats and hence no mails isolate the community to an undesirable extent.

It is probable that in the foreseeable future large tracts of low-producing land in the north may be so developed that all-weather roads will be a necessity. In that event closer settlement and increased production are almost assured. This could lead to the development of Port Hutt (Whangaroa Harbour), the only good haven at the island and to which ships at Waitangi



[*National Publicity*

Fairly good pastures in foreground on clay country; just beyond is an expanse of peaty "clears" which it should be possible to drain and develop into pasture land.

[*National Publicity*

Good pastures on limestone country in the foreground carry large numbers of sheep. Beyond the limestone outcrop in the middle distance and across the road the country is mostly consolidated sand dunes. The large light-coloured area shows the effect of wind erosion when sand dune vegetation is destroyed.

proceed in stormy weather. Port Hutt and its environs must not be overlooked if a freezing works is established at the island and another port is required.

Roads and Access

Of about 187 miles of surveyed road on the map of Chatham Island, excluding many miles of beach which must be travelled over at low tide to reach some farms, it is doubtful if formation work has been attempted on more than 90 miles of the roads shown, and of this length not more than 30 miles of metalled roads have been constructed, and these only since 1946.

Access to the north-eastern end of the island is either by the 4½-mile long ford across Te Whanga Lagoon or by a much longer route round the northern part of the lagoon's perimeter. Such journeys are fairly frequent and as the occasion demands and lagoon conditions permit, the trip is made by horse or high, large-wheel tractor.

Though it is said that there are more registered vehicles on the island per 100 of population than anywhere else in the world, their use is limited because parts of the main roads become impassable to them in winter and people must revert to the use of horses in cold, wet weather. This explains in part why 400 horses are needed by 500 inhabitants. Horse-drawn vehicles are necessary and the jogger or jog cart for which the island has long been famous is still used. Unmetalled roads have grass growing between well-defined wheel ruts; in summer they are dry and dusty, in winter they may be bogs.

With petrol at 6s. 6d. per gallon and sea freight on a 25cwt. truck costing £65 it will be realised that cartage of fertiliser, lime, and domestic requirements is expensive. When cartage becomes impossible owing to road conditions and children cannot go to school because the school bus cannot safely negotiate sections of the roads strong agitation for road improvement is justified.

Air Service

Tasman Empire Airways Ltd. ran a much-appreciated flying-boat service between Auckland and Chatham Island via Wellington, making 6 trips per year during summer. Cessation of this service emphasised the need for an aerodrome for land planes. Flying time between Wellington and Chatham Island is approximately 2½ hours, whereas the boat trip takes over 2 days.

Communication

Radio and radio-telephone communication with New Zealand provides a valuable service to the community. Though there are several party line telephones, one line can be connected to another only at a restricted time during the evening. Remote sheep stations are served by radio telephone through Waitangi and messages can be sent to other settlers at ordinary telegram rates.

Weeds and Pests

As on the mainland, gorse (*Ulex europaeus*) was once planted for shelter hedges, but it has spread far beyond the initial plantations. Diverse opinions are held regarding its existence. It has a distinct shelter value and contributes in a small way to sheep feed, but these virtues are more than outweighed by the amount of land it puts out of production. Arguments in its favour have been countered in recent months and some farmers have begun spraying with 2,4,5-T. If the trials are satisfactory, gorse may soon be controlled on all but short-term lease properties.

Blackberry (*Rubus fruticosus*) is widespread, but there are no large thickets of it. Variegated thistle (*Silybum marianum*) is at present confined to two small areas on public roads. Its potential menace is not fully realised and measures to eradicate it should be taken immediately.

Winged thistle (*Carduus tenuiflorus*) and Californian thistle (*Cnicus arvensis*) are comparative newcomers. Tutsan (*Hypericum androsaemum*), wrongly called St. John's wort, is established among tall fern (*Pteridium*) in places near the lagoon shore. Stinging nettles, including the endemic one (*Urtica australis*), and also horehound (*Marrubium vulgare*) encroach into pasture land, but are of little consequence.

Manuka is established in one place only, near Waitangi, and as far as can be ascertained it was taken from New

Radio transmitting and receiving sets on outback stations take the place of telephones, but only at 8 p.m. when the post office radio station calls set owners individually for the transmission of messages.

Zealand and planted where it now grows. On the scanty evidence obtained the writer questions the authenticity of manuka being indigenous or found only in clumps of bracken as mentioned by Richards (1). If, as is claimed, manuka was introduced to the island, it is then not a native plant and might justifiably be classed as a noxious weed. In any case, its eradication is recommended.

Sedges (*Carex* spp.) and rushes (*Juncus* spp.) are widely established, but they are of little concern on well-farmed land.

Hutiwai (or piripiri) (*Acaena sanguisorbae*), which is indigenous, is common on most parts of the island.

Wild pigs seem to exist in the extreme south only.

Opossums (*Trichosurus vulpecula* Kerr) were reduced appreciably, but are again spreading. Neither rabbits nor hares were introduced to the islands and for that the present-day farmers are grateful.

Recently the white butterfly (*Pieris rapae*) became established and may seriously affect the growing of supplementary crops.

To assist in weed and pest control the Director of the Entomology Division of the Department of Scientific and Industrial Research has undertaken to introduce to Chatham Island at the appropriate season the gorse seed weevil, the Chilian saw-fly which parasitises hutiwai, and also the parasites of the white butterfly.

Action should be taken by local authorities to eradicate noxious weeds and pests before the problems become more serious.

Wekas (*Gallirallus australis*), which are indigenous, are numerous and at times regarded as pests. They are a nuisance in gardens and are reputed to devour the eggs and young of other ground birds.

There is a striking scarcity of small indigenous and exotic birds.

Soil Erosion

Though there is evidence of soil losses by sheet erosion, it is nowhere strikingly apparent. Wind erosion, however, is alarming on some of the hill country south-west from Waitangi. Pilot trials are under way to ascertain how to prevent it and by what means and with which plants the bare slopes can be revegetated in a practicable way.

The coastal fringe, particularly on the north and west of the island, passed through a moving sand dune phase, but the timely planting of marram grass has almost arrested sand movement. Most of the sand dunes are now reasonably safe and are used for wintering stock, especially where edible plants have established among the marram grass. Despite the relatively stabilised condition of the dunes, caution must be observed lest a break occur and sand movement begins again as it did recently near Te One.

Drainage

Many acres of relatively flat land near Waitangi lie wet for most of the year, but if the discharge channel from Lake Huro were deepened, pastures could be improved and the area would be more productive.

As Te Whanga Lagoon is approximately at sea level, there is virtually no hope of draining the miles of low-lying land on its shores. According to wind direction and velocity, so may the depth of water vary at one end or other of the lagoon. Large areas which are inundated at one time may be comparatively dry later and on such occasions stock browse on the aquatic and semi-aquatic vegetation on the lagoon shores.

Apart from other small areas which need draining there are thousands of acres of rolling hill country, the peaty "clears", which if drained would no longer be wasteland. Further reference to draining "clears" is made later.

Public Welfare and Social Life

The relatively small and much dispersed community is administered by the Resident Commissioner of the Department of Island Territories. As the representative of practically all Government departments, the local constable performs a multitude of duties in addition to those normally undertaken by members of the Police Force.

The Chatham Islands as a group are constituted as a county which has an elected council that attends to normal local body affairs. There are no overdue rate accounts, owing to the novel rating system, by which rates are levied on all inward and outward cargo instead of on land as is customary.

There are churches for two denominations each being served by a resident clergyman.

A small, up-to-date hospital equipped with X-ray plant is situated at Waitangi and superintended by the Resident Medical Officer.

The annual race meeting on New Year's Day at Waitangi is a highlight of social life. Two public halls are equipped with film projectors and screenings take place on alternate Saturdays at Te One and Waitangi. As in most country places a good deal of the social life is centred on the hotel.

Sporting activities such as racing, tennis, football, and dancing are well organised and fishing, shooting, picnics, and horse riding are indulged in freely. The formation of a bowling club is being considered.

There is abundant game to be shot in season and swans, of which there are thousands, are not protected and provide year-round sport. With such a variety of outdoor activities the island could be an attractive holiday resort, but accommodation for tourists is inadequate.

What of the Future?

Though optimism regarding the future appears to have overcome a pessimistic trend that resulted from a degree of frustration in early years, the people are aware and concerned

that numerous problems peculiar to their own community still await solution.

It may be regarded as presumptuous for the writer, who has spent a total of only a few weeks on the island on four occasions, to advise on what should be done, but having a knowledge of the problems he feels it a duty to draw attention to them and suggest how some of them may be overcome.

Remoteness of the island and the comparative isolation of the people have precluded their participation in many social and business activities enjoyed by mainlanders and it has deprived them of regular contact with agricultural advisory officers.

In the interests of the prosperity of the island's people improved farming should be encouraged and land development and settlement schemes similar to mainland ones should be undertaken. Expenditure on such schemes should be just as fruitful in creating national assets on the island as it has been elsewhere, but the work envisaged will require the use of heavy machinery which farmers cannot afford, and State assistance would be needed in major development works of various kinds.

It is perhaps visionary to suggest that the carrying capacity of the island might be trebled, but there are no physical reasons why progress should not be as rapid and as spectacular as it has been in parts of New Zealand. The similarity Chatham Island bears to the west coast of the southern half of the North Island indicates that North Island farming practices should replace the South Island ones which have prevailed in the past, and this must be considered in any future plans for land utilisation.

Land Tenure

Though many farms are freehold, others are on leasehold Native land.

Determination of ownership and tenure is vital for the morale and ambition of the occupants of certain properties. Contrasts between freehold or long-lease farms on the one hand, with short-lease ones on the other, reveal that in the interests of land development and better farming matters of tenure should be settled promptly.

Short-term leases are unsatisfactory to both lessors and lessees, because the land either remains idle, a harbour for weeds, or may be so mismanaged by overstocking or by periodic burning off that pastures are punished and deterioration of the land is inevitable. Furthermore, maintenance of fences and buildings is neglected and housing conditions on some such farms are sub-standard and contrast with those on freehold or long-lease farms. Many of the better homes are as modern and convenient as those on numerous farms in New Zealand. Reliance is usually placed on tanks for water supply, and where water is plentiful

[*National Publicity*

The children in the foreground are standing in an old peat-fire hole. Before tractor work is begun fern-covered "clears" should be burnt off to reveal these danger spots.

septic tanks have been installed. On one farm a stream has been harnessed to provide electric power for domestic and farm needs. On others 240-volt generators driven by diesel engines are slowly replacing 12- and 24-volt house-lighting plants and these in turn are replacing lamps of various types.

Closer Settlement

Several of the smaller farms are perhaps too small to be economic units in lean years and a few holdings are too large to be managed efficiently with the labour now available. Cutting up such properties for closer settlement should help to overcome the labour scarcity in time, but it is necessary to warn that this might be overdone, because with high marketing charges, farms must be sufficiently large to carry about 50 per cent. more stock than would be needed to give a good return on New Zealand farms. Over-assessing of the quality and productivity of pastures has occurred in the past and it must be avoided in future in determining the acreage of farms for settlement.

Pasture Management

Chatham Island farmers will probably derive more benefit by better management of their pastures than from any other treatment. Until stock can be concentrated on specific areas at will there is little prospect of improving the pastures, most of which become tall and rank in summer. The

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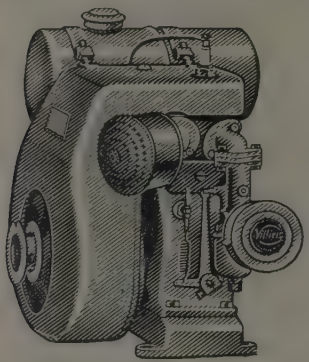

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smothering effect of rank grasses and selective grazing by sheep are the main reasons why clovers and the most palatable grasses are weak and sparse and dominated by inferior ones. Paddocks free from roughage are a rare sight except in late winter and early spring. Good pasture management demands the full and proper utilisation of all feed, and to accomplish this rotational grazing is essential.

Further subdivision of most farms will be slow, because the supply of fence posts is almost exhausted. Scarcity of stone and gravel combined with high costs of cement and reinforcing steel for making concrete posts compels farmers to use imported silver pine posts in the meantime. The electric fence is not widely used, but can possibly find a useful place. The principal drawback at present is the difficulty of getting batteries recharged.

It is unfortunate that at the instigation of a minority of farmers (and some stock agents also), who contemplate immediate pecuniary gains, the shipping of cattle in spring has been arranged despite the fact that ultimately this will reflect adversely on both pastures and sheep. The grass-conscious farmers hope to organise the shipping of cattle in autumn in future rather than struggle to carry them through lean winters. There is not a surplus of cattle in summer. Provision of water may present a problem, but not generally an insuperable one.

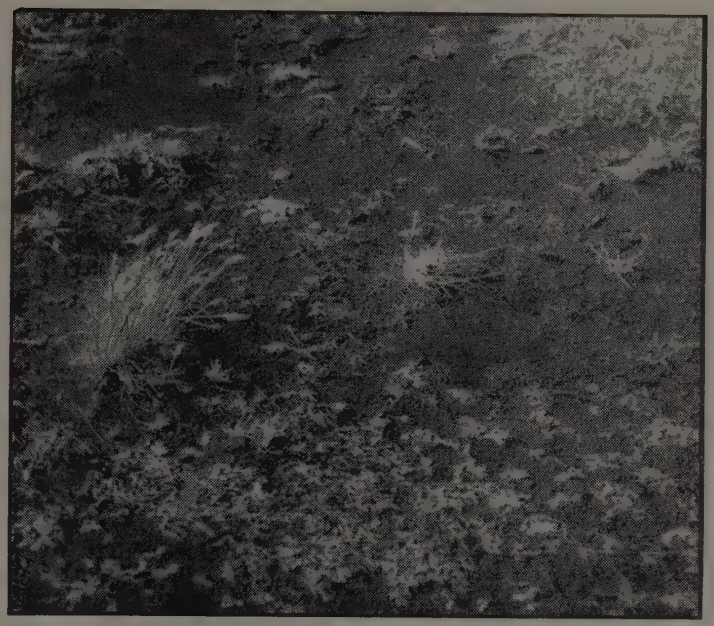
A striking feature on farms with a high sheep-to-cattle ratio is the prevalence of hutiwai, rushes, sedges, fern, and a host of other plants that sheep normally neglect. Farms which are fairly well stocked with cattle or under intensive sheep grazing are comparatively free from such weeds. The detrimental effect hutiwai burrs have on wool values justifies a radical modification of pasture management to eradicate it. Rotational grazing by sheep and the use of more cattle are recommended.

Pasture Improvement

Most of the pastures are poor, but they can be improved. In some cases this means renewal after ploughing; in others renovation by oversowing and topdressing will suffice.

Renewal

Pasture renewal will be required on completely run-out, weak, open, and weedy pastures. After ploughing or discing, one or two crops should be grown and there is a choice of chou moellier, swedes, turnips, or cereals, of which N.I.A.B. ryecorn appears promising. When the crop has been eaten off, the land should be lightly cultivated so that animal manure is not buried deeply. Some days before the grass is sown a ton of lime per acre should be spread and at seeding time up to 3cwt. of phosphate should be applied. Seeds mixtures can be varied to suit conditions,



Odd plants of grass establish naturally among moss, lichens, and weeds on drier parts of the "clears".

but the following is suggested as a basis:—

	Lb. per acre
Certified perennial ryegrass	20
Certified short-rotation ryegrass	5
Certified cocksfoot	4
Crested dogstail	3
Certified Montgomery red clover	2
Mt. Barker subterranean clover	2
Tallarook subterranean clover	2
Certified white clover	2
Lotus major	1
Total	41

As seed is expensive and freight charges add to costs, only the highest-quality seed should be bought.

In the northern and other warm regions paspalum at 5lb. per acre might be added to the seeds mixture. Subterranean clover should be omitted on heavy, wet land and ½lb. of strawberry clover and 1lb. or 2lb. of timothy included.

Renovation

Pasture renovation involves the introduction of better species, especially clovers, and the raising of the fertility of the soil. Early autumn oversowing with the following mixture is recommended:—

	Lb. per acre
Certified white clover	2
Certified Montgomery red clover	2
Mt. Barker subterranean clover	1
Tallarook subterranean clover	1
Lotus major	1
	7

Plot trials indicate varying success in establishing clovers from one place to another, perhaps because of soil conditions, climate, or incorrect grazing management. As there are no bumble bees on the island, red clover may not perpetuate itself by reseeding, but its vigorous growth on some plots justifies its inclusion in mixtures. White clover is widely distributed on the island, but is scarce or non-existent on too much country.

Lotus major and subterranean clover grow well in several places, but are apparently restricted to regions where they were sown. Further trial plots were sown last autumn and more will be sown in the coming season to investigate establishment problems. Trace minerals in addition to standard fertilisers will be used and seed inoculated with cultured rhizobia (nodule-forming bacteria) will be tested against untreated seed.

Only one or two paddocks should be oversown each year, as otherwise grazing management problems may arise. Seedling clovers must not be

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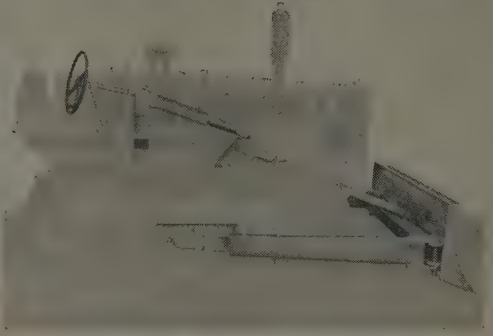

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grazed closely nor must they be smothered by rank growth. As subterranean clover is an annual, it must be allowed to reseed in the first season, so it should not be grazed during the flowering and seed-setting period.

Above—Drains on sloping peat land are dug with shovel, spade, and axe and naturally progress is slower than if modern drain-digging machines were used. Below—Profile on "clears", showing turf at top overlying unconsolidated peat, then light-coloured layer of peat ash, and below this hard peat of a good burning type.

The road to Kaingaroa runs for miles through well-sheltered grazing land.

Clovers are essential in improving run-out pastures, and to get the maximum benefit from oversowing, paddocks so treated should be topdressed with up to 3cwt. of phosphate at seeding time and again within a year. Lime at up to 1 ton per acre some time before oversowing should prove profitable. Interest in lime responses in some paddocks has revealed the existence of several abundant deposits, miles apart, that could be exploited by nearby farmers.

Now that honey bees appear to be successfully reintroduced, white clover should produce seed and spread in topdressed pastures.

Where oversowing of large tracts of country is not practicable the establishment of clover nurseries is recommended. Nurseries of about 1 acre, strategically located on the property, should be properly cultivated, limed and topdressed with phosphate, and then sown with the clover mixture recommended for oversowing, but at about twice the seeding rate per acre. Subsequent to periodic light grazings the nursery should be closed to allow clovers to produce seed, after which cattle can be turned into the enclosure for about ½ hour to consume some ripe seeds. Such grazings can be repeated every 10 to 14 days as seed ripens until it is all eaten. After each grazing the cattle should be driven to a clover-deficient pasture, where they will distribute seed in their droppings, which are perhaps the best medium of all for clover establishment.

Land Development

There are two processes by which land development can be undertaken, cultivation and burning and sowing.

The cultivation process: This differs little from pasture renewal mentioned earlier and it should be done in a similar way except for the initial clearing, cultivation, and cropping. The main difference here is that in the breaking in of new country, especially fern land, tractor work should not be begun until tall growth has been crushed down by cattle or burnt off so that dangerous hollows can be seen easily. Other advantages in burning fern and tall growth are that cleaner cultivation is possible and the soil can be consolidated more rapidly and effectively.

Every occupant of undeveloped land should bring in at least one paddock each year, the area being determined by the equipment, labour, and finance available. The area should not exceed that which can be properly stocked and managed. As the first ploughing or discing is not likely to leave the surface uniform, at least one crop should be grown to prepare the ground for either a second one or a temporary pasture, for which 30lb. of Italian ryegrass and 4lb. of broad red clover is recommended. Such a pasture should provide abundant feed periodically during winter and spring and a good silage or hay crop later.

Following the crops and temporary pasture further cultivation should prepare the land for permanent pasture, which should be laid down in the manner prescribed for pasture renewal. The quality and production of new pastures depend on management and treatment. Close grazing during the first few months is detrimental and tall growth which smothers clovers and slower-establishing grasses is equally harmful. It is false economy to neglect topdressing and every autumn at least 2cwt. of phosphatic fertiliser should be applied. Regular dressings of lime for the first 2 or 3 years are recommended.

[*National Publicity*

When holds are full sheep being shipped from the Chatham Islands are penned on deck. Storms on the voyage may cause mortality and sometimes animals are washed overboard. Others may die of exposure.

The burning and sowing process: The aim in this is to speed the conversion of fern and scrub land into grassland. In addition to the ploughing and sowing of one paddock each year at least one other should be burnt off and surface sown to provide more grass for a year or two or until that ground can be properly cultivated and regrassed. Burning off should be done in late summer, when a good hot fire can be expected, and the following seeds mixture should be sown on the ash immediately after the fire:—

	Lb. per acre
Certified Italian ryegrass ..	10
Certified short-rotation ryegrass	10
Crested dogstail	2
Montgomery red clover ..	2
Mt. Barker subterranean clover	2
Certified white clover ..	1
Lotus major	¼

A dressing of fertiliser at seeding time is recommended.

Peat Land or "Clears"

At present little attempt is being made to drain the peat land or "clears" and bring it into production, but what has been accomplished on large tracts of peat swamps in New Zealand indicates that the miles of sloping peat land at Chatham Island could be converted into pastoral country. The elevation and natural slope of the "clears" should make preliminary drainage easy, as this could be done merely by ploughing deep furrows across and slightly down the slope. A series of such furrows should remove most of the surface water and allow the surface to dry out sufficiently for stock to meander over it more than they can now when browsing on the sparse herbage.

Cemented ironstone seams appear on the surface of sloping wet peat land and usually they are tilted in the opposite direction to that of the land itself. The retention of water, and hence the development of peat, which according to Allan (1) may be 40ft. deep in places, is probably due to the ironstone seams.

Odd grass and clover plants establish naturally but sparsely on the surface crust which develops wherever stock tramp and consolidate the peat. This indicates that preliminary drainage followed by oversowing with paspalum, Yorkshire fog, white clover, and *Lotus major* should prepare the ground for the second stage of development, which will involve considerable expenditure in planning and the procurement of suitable machines and equipment.

Undoubtedly the "clears" will be transformed from almost worthless wasteland to good grazing land ultimately, either by farmers being granted assistance under the Marginal Lands Act or as a State enterprise.

Meat Freezing Works

If and when developments visualised by the author materialise, productivity should be so increased that a freezing works will be needed and in that event stock could be sold in prime condition at higher prices than they fetch as store stock. Provided that any losses on a freezing works plus the costs of shipping frozen meat do not exceed the total costs of shipping and selling surplus store stock (up to 22s. 9d. for sheep and £12 for cattle), what might appear to be an uneconomic freezing works could be profitable to the Chatham Island farmers.

Under the present system of stock disposal the fertility of the land is being slowly depleted. Blood and bone fertiliser from a local freezing works would be valuable for topdressing pastures and would offset to some extent the necessity of importing fertiliser from New Zealand.

Building and installation costs would involve considerable capital outlay, but running costs might be more reasonable than it would appear at first. Fuel oil and coal importations could be kept low if the peat which is in abundant supply proved to be of good calorific value. It burned well when tested in a kitchen range and open fire.

Conclusions

The ever-increasing demand for food requires that attention be focused on the Chatham Islands, where there is great scope for raising production by improving existing pastures and developing more land. Such progress would lead to greater prosperity, a larger population, better amenities, and a wider sphere of business and social activities.

Many more miles of metalled roads must be constructed and some of the machines procured for such work might also be used for land drainage and development.

Though there is need for more research into several aspects of farming, the islands offer wide fields for exploration in other sciences also. Additional geological surveys to those made by Allan might be both profitable and interesting. For instance, the writer found two things of geological interest, namely what appeared to be a fairly large deposit of limonite (identified as such by Dr. L. I. Grange, Director, New Zealand Geological Survey) and numerous fossil spines of what Dr. H. B. Fell, Senior Lecturer in Zoology at Victoria University College, believes may be from a tropical sea urchin (probably *Eucidaris*).

Acknowledgments

During his visits to the island the writer enjoyed hospitality and co-operation from many people too numerous to name. To all of them he is grateful.

References

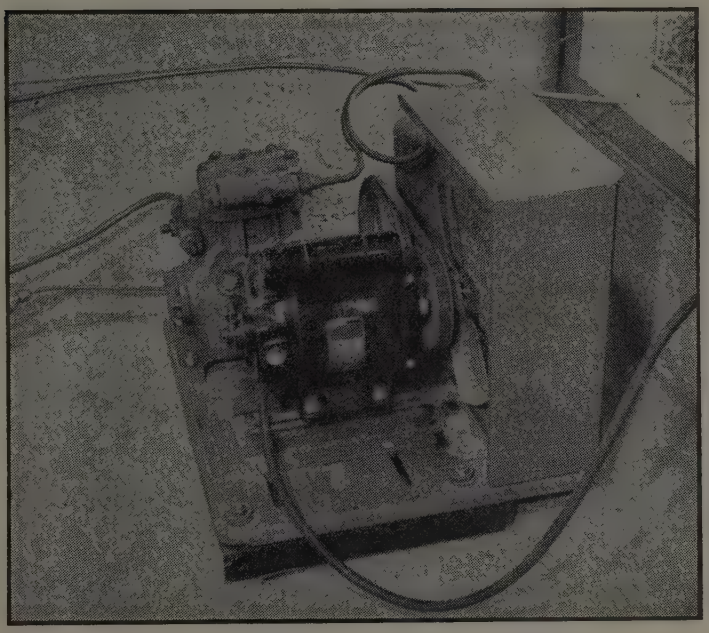
(1) E. C. Richards: "The Chatham Islands, Their Plants, Birds and People", 1952.

(2) R. S. Allan: "Transactions and Proceedings of the New Zealand Institute", vol. 59, p. 824, 1928-29.

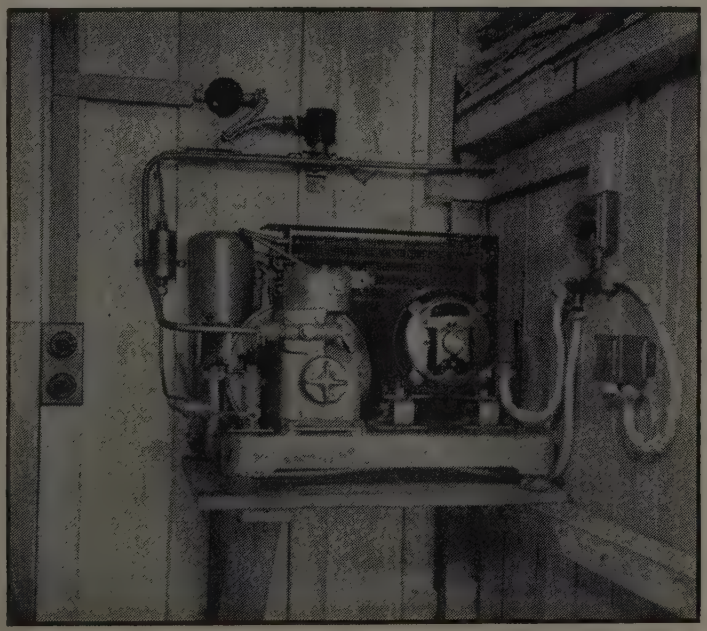
Construction of a Beekeeper's Cool Room

DURING summer in most parts of New Zealand beekeepers have considerable difficulty in preparing honey for the local markets in its most attractive form. The solution to this problem is the installation of a cool room in which the honey can be quickly reduced in temperature, thus ensuring a smooth-grained product. In this article C. R. Paterson, Apiculturist, Department of Agriculture, Hamilton, gives details on the construction of a cool room suitable for the average commercial beekeeper.

QUICK granulation of the honey is necessary if a good, fine texture is to be obtained. Warm day and night temperatures during summer prevent the temperature of honey stored in the tank from dropping to a level when quick granulation can be expected. Most beekeepers have had the annoying experience of adding considerable quantities of good, and perhaps precious, starter honey to a tank of honey, carrying out the usual procedure of stirring, and seeing the honey begin to cloud but apparently not to firm. In the hope that something will happen stirring is carried on and the honey left longer in the tank. Then, much to the consternation of the beekeeper the honey begins to go quite sugary and in this condition is not at all suitable for marketing. This calls to mind the much-quoted saying: "Slow granulation gives coarse grain, though quick granulation gives smooth grain".



Air-cooled refrigeration unit placed in cool position.



This refrigeration unit is in a rather warm position, but it is water cooled.

During winter this problem does not exist, because temperatures have dropped sufficiently to encourage quick granulation. How therefore can cooler conditions be secured during the few warmer months?

Fortunately this problem can be easily solved, but the cost is rather high. Small, well-insulated rooms have been constructed and these are kept at a reduced temperature by standard refrigeration units. In beekeeping language these are "cool rooms", as the temperature maintained in them is about 50 to 57 degrees F. This is considered the ideal temperature range for rapid granulation of honey.

Installation

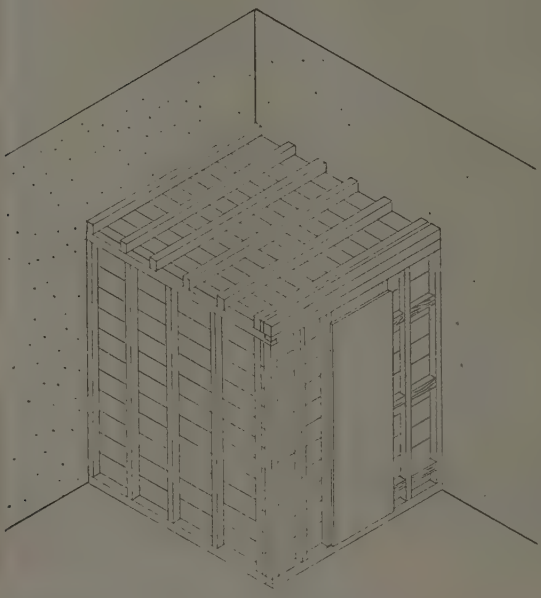
Many of these cool rooms are now in use and comprise:—

1. Standard refrigeration unit consisting of motor, compressor, liquid receiver, expansion valve, evaporator, and blower. (See diagram on page 359.)
2. Cool room constructed inside the honey house of suitable insulating material. An insulated door gives access to the room. Generally 2 to 3 tons of packed honey can be held in the room at a time.

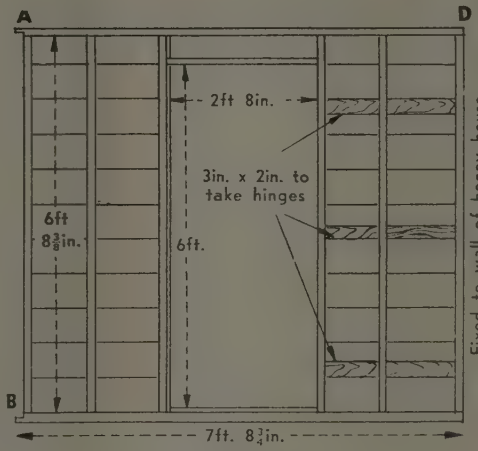
Construction

Though very low temperatures are not required, beekeepers should not

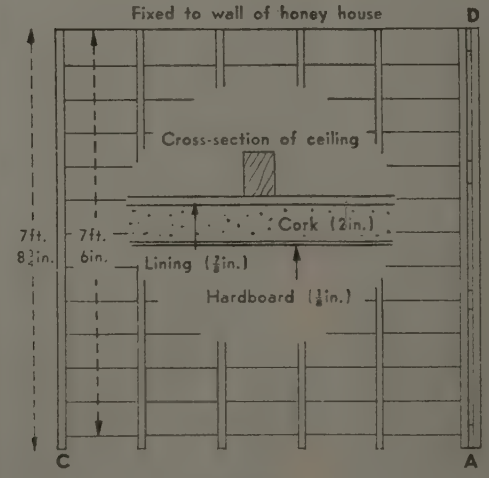
CONSTRUCTION DETAILS OF BEEKEEPER'S COOL ROOM



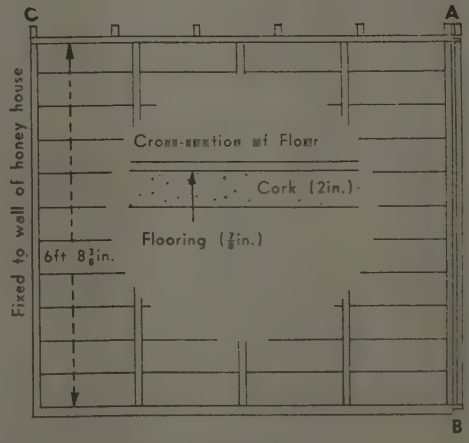
Framework of cool room in position. Vapour seal and cork are placed on the inside.



Front wall and door of cool room.



Plan of ceiling.



Side wall with ceiling in place.

attempt to take short-cuts in the construction of their cool rooms. Definite structural principles should be carefully followed, as otherwise trouble can be expected after a short period or the refrigeration unit may be compelled to run at capacity for long periods.

Location

Cool rooms are generally placed within the existing honey house in some handy corner close to the packing room.

Framework

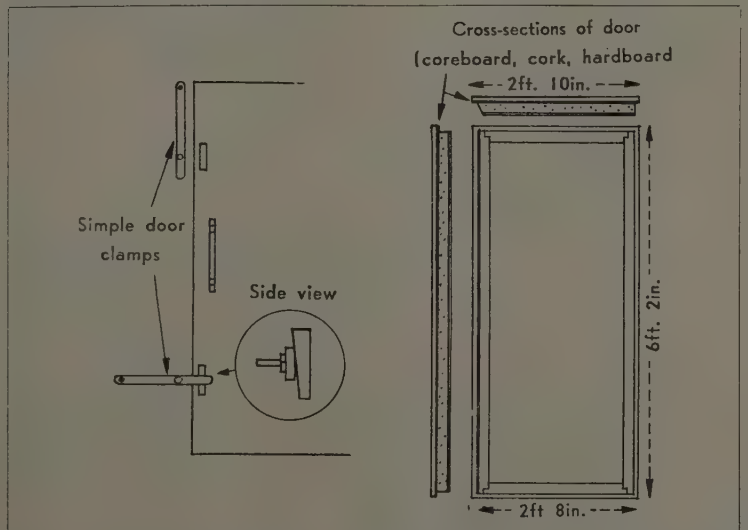
Only the framework for two sides will be required, provided the walls of the existing building are suitable for the other sides. The timber should be well dried and dressed on four sides to assist in the construction of walls with an even surface. If radiata pine is used, it should be the commercially treated timber to prevent mould growth. The sketch plans are for a room with 7ft. x 7ft. x 6ft. 6in. inside measurements. This size appears to meet the requirements of most commercial beekeepers and at the same time allows for the installation of a standard 1/3 h.p. refrigeration unit.

The framework can be constructed on the floor and then placed in position. It will be best to leave out for the time being the stud against which the door will shut, as this stud has to be nailed in on an angle to make a snug fit with the bevel on the door. The ceiling with lining boards can also be assembled on the floor and then placed in position. The framework must be firmly fixed to the honey house walls to prevent the possibility of any movement after the insulation has been placed in position.

There appears to be no need to use an elaborately made-up door of the type used in most cooling chambers. The door can be made from a piece of straight core board 7ft. x 3ft. x 1in. thick (approximately) The core board is cut to allow about 1in. overlap over the door opening. A frame of 2in. x 2in. timber is then fitted to the core board 1in. in all round from the edge of the core board. This frame takes the insulation for the door and fits against the door opening. The part of the frame which will come against the stud when the door is closed should be bevelled slightly. The door can next be placed in position and the stud which was left out of the framework nailed into position to correspond with the bevel on the door frame. In the hanging of the door allowance should be made for the thickness of the hardboard which will be used on the outside of the cool room. The inside of the door can be sealed with bituminous paint and the insulation (cork sheets) then placed in position. A piece of hardboard should be nailed on to the framework to cover the insulation. Three strong hinges will be required. T type will do, or gate type can be used if carefully fitted.

As the door has to cover a fairly large opening, two closing levers are necessary to ensure a satisfactory fit. They can be of the bevel type as shown in the diagram at left. Before the door fittings are adjusted rubber sealing should be glued on the inside lip. This should effect a complete seal when the door is shut and clamped. Three extra pieces of 3in. x 2in. timber will have to be set into the framework of the cool room to take the screws for the door hinges. Once this has been done and the door fitted a start can be made on the lining boards. These should be securely nailed to the inside of the building. Care should be taken to make a neat job, as any unevenness or sharp edge is liable to damage the

A second-hand freezing-room door was used on this cool room. The pumice blocks are lined inside with cork.



Construction of insulated door of cool room.

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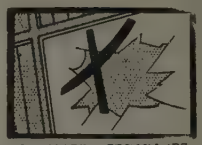

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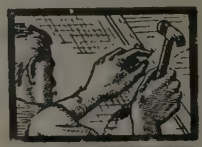

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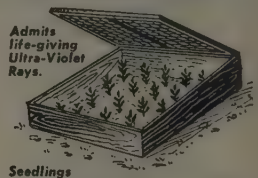

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vapour seal which is placed over the lining boards. The room now has the ceiling and four walls with a suitable foundation on which to fix 2-ply tarred roofing material and then insulation. As the floor will be tongued and grooved timber or concrete, it should be smooth enough to take tarred roofing material.

Vapour Seal

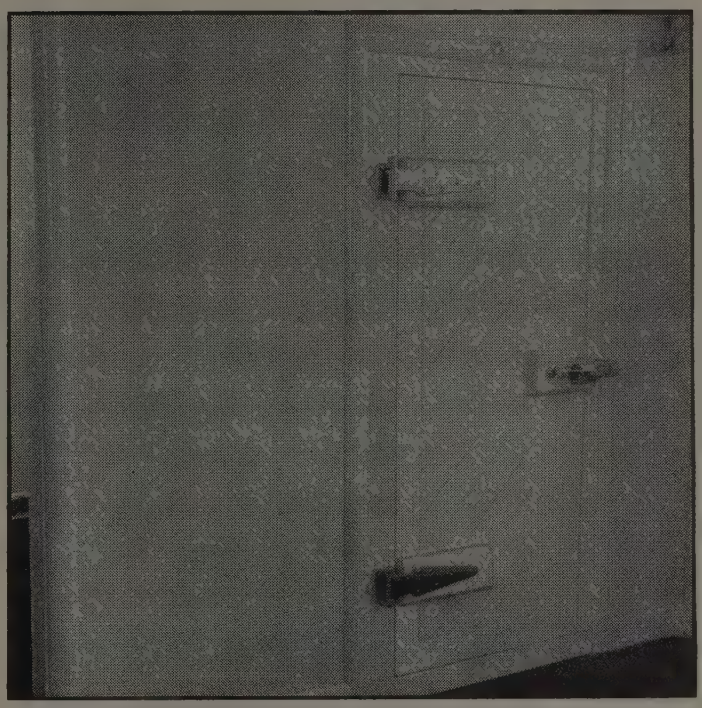
A start can now be made on the vapour seal with the tarred roofing material. It would be an advantage to give the timber a coating of bituminous paint before beginning to tack on the tarred roofing material. When this work is being done the aim is to make the room impervious to outside moisture. All joins in the sealing material should be carefully sealed with bituminous paint and lin. clouts. Heads of clouts and any cracks must be carefully covered and sealed with the same paint. The tarred roofing material must fit neatly into the corners so that it is not damaged when the insulating material is being placed in position.

If the floor is of wood, the tarred roofing material should be placed all over, care being taken to bring the edges neatly up the walls for several inches. The insulating material goes on top of the floor seal and is then covered with floor boards to give stability to the insulation, as fairly heavy material will be moved about on this floor. If the cool room is built on a concrete floor, tarred roofing material is placed in position as on a wooden floor and then a fine-mix concrete can be used to bring the level up to the door plate. Plenty of air space should be provided under a timber floor to guard against dry rot. A concrete base is always preferable if this is at all practicable.

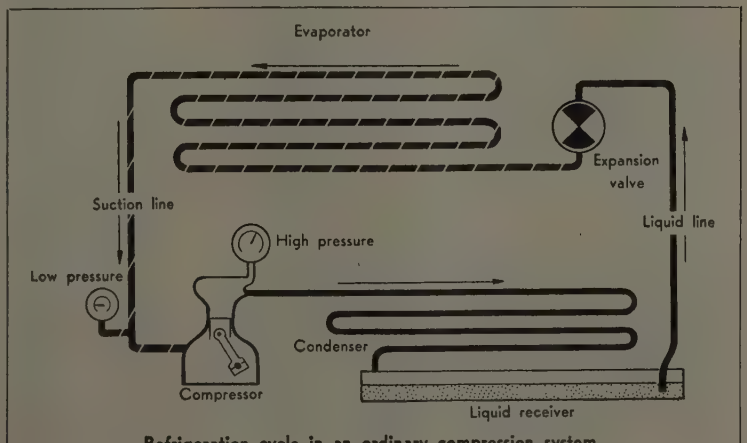
Insulation

If cork is being used for insulation, it will be bought in sheets 3ft. x 1ft. x 2in. thick. Some arrangement will have to be made to melt pitch, because each sheet of cork has to be immersed in heated pitch and then quickly placed in position. Information on the correct procedure should be available from the firm supplying the refrigeration unit, and some suppliers will lend heating appliances suitable for handling pitch.

Wood pulp wallboard appears to give ample insulation for the temperature required in beekeepers' cool rooms and it is much easier and more convenient to install than cork. As 4 layers will be required, it will be best to put the first layer all over, taking care to make neat joins and sealing these with bituminous paint. The next layer should be put on so that all the first joins are covered. This procedure is followed until the last sheet is put in place and all joins are carefully sealed. Longer clouts will be required for the final sheets.



A factory-made door with expensive fittings.



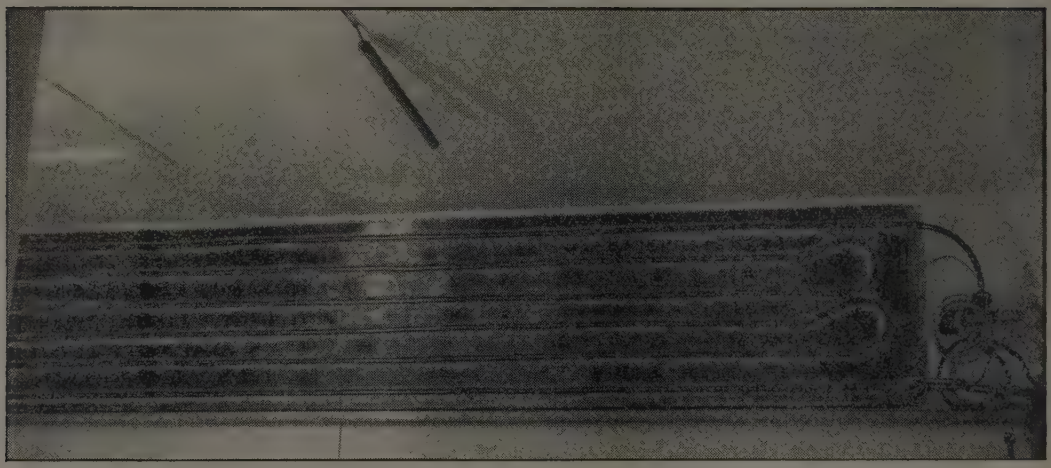
Refrigeration cycle in an ordinary compression system.

Inside Lining

To cover the insulation and protect it from damage, sheets of hardboard should be carefully placed in position around the walls. The joins can be covered with wood strips. It is also desirable to fit quarter-round strips in the angle of walls with the floor. This prevents cases being stacked hard against the wall, thus allowing free circulation of cool air round the honey.

The inside of the cool room should be painted with a light-coloured paint, such as aluminium or oil-bound distemper, to increase visibility.

To finish off the cool room hardboard should be fixed neatly on the outside of the framework and finished off with a good washable paint.



Home-made evaporator coil. Only a person handy with tools should attempt to make up such a unit.

Refrigeration Unit

A standard refrigeration unit rated at approximately 1/3 h.p. appears to give satisfactory results for a room of the size described. The results from the unit will depend greatly on the efficiency of the insulation of the cool room to maintain a reduced temperature. The compressor unit is placed outside the cool room on the floor or on a bracket on the wall. An air-cooled refrigeration unit must be placed where it can get rid of the heat taken out of the honey stored in the cool room.

The appliance which goes into the cool room is the evaporator coil and these coils are generally of the blower type. They are usually designed to give fairly moist air conditions, whereas the beekeeper requires much drier air for the storage of honey. This point and the area of evaporator surfaces (42 sq. ft. to 55 sq. ft. for a room 7ft. x 7ft. x 6ft. 6in.) should be mentioned when the purchase of a unit is being arranged, so that a suitable type can be selected to meet the beekeeper's special requirements.

Building Materials

The following is a list of the building materials required:—

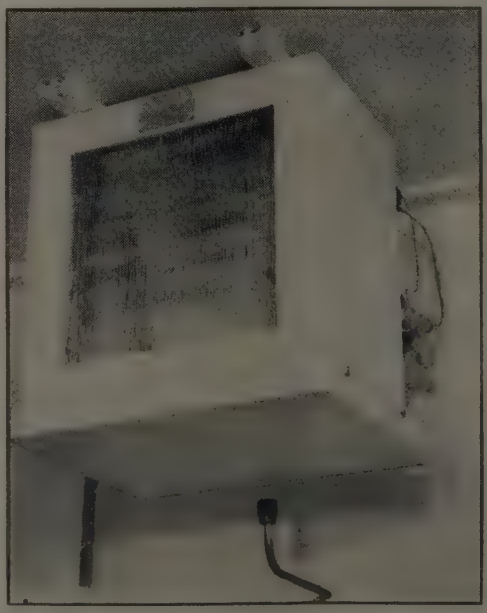
Timber: Frame, 11 lengths 8ft. long of 3in. x 2in. dressed (2¾in. x 1¾in.); 14 lengths 7ft. long of 3in. x 2in. dressed (2¾in. x 1¾in.). Lining, 36 lengths 8ft. long of 7½in. x ⅜in. (an extra 24 lengths are required if four sides are to be lined). Floor, 16 lengths 7ft. long of 5½in. x ⅞in. flooring.

Tarred roofing material: 105ft. of 3ft. wide 2-ply.

Wood pulp wallboard: 42 sheets 7ft. x 4ft.

Hardboard: Inside, 7 sheets 8ft. x 4ft. Outside, 3 sheets 8ft. x 4ft.

The above materials should cost approximately £75, but prices will vary according to how they are purchased and the quality of timber. The total cost for the cool room may be about £175. Some beekeepers have installed very satisfactory cool rooms for much less than this, but others have found the cost just over £200. Sometimes satisfactory second-hand units are available at reduced prices, but care is necessary in the purchase of second-hand refrigeration plant and a refrigeration service engineer should first be consulted.



Blower type evaporator coil.

Method of Using Room

Some beekeepers prefer to place packed honey, carefully stacked, directly in the cool room. This takes considerable time and makes the removal of the first lot rather difficult. With the door in the centre it is possible to stack up cases of honey on each side. This allows the removal of any particular line without undue confusion. The time that the honey will require to remain in the cool room will depend on the temperature of the honey, degree of granulation, and efficiency of the cooling unit. Most beekeepers find that the time varies from 4 to 6 days and all are most definite that they could not place on the market smooth-grained honey during summer without the use of a cool room.

Control of External Parasites of Household Poultry

MANY household poultry keepers do not realise the adverse effect external parasites have on poultry. When they are prevalent among birds lice, depluming mites, and scaly leg mites may cause a loss of body condition, drop in egg production, and lowering of resistance to disease. In this month's article H. H. Watson, Poultry Instructor, Department of Agriculture, Wellington, discusses methods of controlling external parasites.

THE different types of lice found on poultry are usually classified according to the part of the body they infest—body lice, head lice, and wing or shaft lice.

Body lice are the most common and, like other species of lice, they irritate the bird by their biting action, but they do not suck blood. They live on fragments of feathers, scales of the skin, and similar debris. Lice spend the entire life cycle on the bird and cannot live away from the host for more than a few days. All poultry keepers should familiarise themselves with the appearance and actions of body lice and learn how to find them quickly. When lice are fully developed they are about the size of a pinhead and are light in colour and very active.

Body lice are normally found in the fluffy feathers near the vent. The feathers should be parted with the fingers and a close inspection made on the exposed skin. As the lice prefer the cover of feathers, they can usually be seen scurrying for shelter. If only a few are present on a bird, they can easily be missed in an inspection. Only when a bird is badly infested will they be found on parts of the body other than the abdomen.

[*From "Diseases of Poultry", Collegiate Press, Iowa, U.S.A.*

A male body louse.

Lice breed prolifically and the eggs or nits are laid in clusters at the bases of the feathers, particularly those near the vent. The eggs are greyish white, pear shaped, and firmly attached to the feather shaft. They hatch out from a week to 10 days after being laid, and the young lice reach maturity in about 2 weeks from hatching.

Head and wing lice are different in appearance from body lice, being longer, narrower, and darker. They are sluggish and remain nearly stationary in a specific part of the body, such as the head or wing, and consequently are more difficult to find. Because of the very rapid multiplication of lice inspections of birds should be made periodically. Heavy breeds are more likely to be infested than light birds, because they are heavier in feathering round the abdomen. Male birds are far more likely to be infested than female birds, because they do not dust bath to the same extent.

[*Niederer*

An inspection for wing lice should be made by fanning the wing open. Particular attention should be paid to the spaces between the barbs of the main wing feathers.

Broody hens should be treated against lice before being placed on eggs or chicks. Unless this precaution is taken, the restless hen may desert her responsibilities. Chicks affected by lice will be handicapped by retarded growth and stamina.

Adequate dry litter on the floors of fowlhouses allows the birds to dust bath. This assists in keeping the skin free of debris and skin fragments and so discourages lice from harbouring on birds.

Destruction of Lice

The insecticide most commonly used for the control of body lice on poultry is nicotine sulphate. This should be painted along the tops of the perches in the laying house, preferably after any droppings which may be caked on the tops of the perches have been removed. The liquid should be applied in a ¾in. to 1in. strip on the perches just before the birds go to roost in the evening. A calm evening should be chosen for the purpose, as wind or draughts blow away the nicotine fumes, which to be effective must permeate the feathers of the birds. The heat of the birds' bodies releases these fumes at roosting time. A second treatment should be given 10 to 12 days later. The first treatment kills the adult lice, but does not affect the eggs or nits on the feathers. In the meantime these hatch out and the lice from them are killed by the second treatment.

If individual birds have to be treated, a few drops of the nicotine sulphate may be applied to the skin below the vent, under each wing, and on

the breast. The drops should be gently rubbed into the skin.

Care should be taken with this method of treatment, particularly in hot weather and where birds are in an enclosed space. Under these conditions the fumes liberated may be excessive and harmful to birds.

Proprietary perch paints can be bought for use on the perches in a similar way to nicotine sulphate. Several D.D.T. and benzene hexachloride proprietary dusts are also available, involving hand treatment of individual birds.

Scaly Leg Mite

Scaly leg is caused by minute mites excavating under the scales of the legs, where they live and breed. The lesions usually appear first near the foot and the joints between the toes. The parts affected appear to be enlarged; later the scales are raised and so the leg and foot become roughened. Usually dirty or bad conditions accentuate the trouble. Older birds are more likely to become infested than younger birds, but the risk of parasitic infestation to the latter is greatly increased when they are reared with older birds.

Unless this trouble is checked in the early stages, the mites will multiply to such an extent that they burrow deeper and deeper into the leg tissue. Eventually this causes lameness and so affects the health of the birds and their production.

The condition is spread by contact and it is therefore advisable to remove and isolate affected birds for treatment.

Individual treatment is necessary to cure this trouble, and the application of kerosene, or better still 1 part of kerosene to 2 parts of linseed oil, to the affected parts is effective. Care should be taken not to let kerosene or kerosene and linseed oil come in contact with the flesh of the leg. When the birds have to be cured quickly for show or sale purposes the cure can be hastened by removal of the crusts and the scales before the application of a medicine. This is done by brushing the legs and feet with a stiff toothbrush after they have been soaked in hot, soapy water. The application every 3 days of a paste made of 20 per cent. sulphur ointment (1 part of sulphur to 5 parts of lard or petroleum jelly by weight) will soon clear up the trouble.

SUBSCRIPTION RENEWALS

Renewals of subscriptions to "The New Zealand Journal of Agriculture" should be paid to the nearest office of the Department of Agriculture. Subscribers can ensure continuity of delivery by paying their subscriptions as soon as possible after receiving their renewal notices and at least 1 month before the old subscription expires. When payment is made the renewal notice should accompany the subscription to ensure that the correct details are recorded.

Concrete Posts for Farm Fences

TWO codes now influence the form fences will take in New Zealand. They are the Fencing Act of New Zealand and its amendments and the standard for fencing posts and struts as set out by the New Zealand Standards Institute.

Fencing Act

The Fencing Act describes a sufficient boundary fence and now recognises the use of reinforced concrete posts as part of a boundary fence within the meaning of the Act. The Act also describes, among other things, the spacing of posts and battens and the following details for gauge and spacings of the wires.

For a boundary fence of not less than 7 wires and of post and wire construction the requirements are:—

Wire, galvanised and not lighter than No. 8 gauge.

Barbed wire, galvanised with barbs 6in. apart.

Bottom wire not more than 5in. from the ground and the 3 bottom wires not more than 5in. apart. Top wire not less than 3ft. 9in. from the ground. The spacing of other wires is optional. Not more than 2 wires may be barbed, and barbed wire may be omitted if the interested persons agree.

New Zealand Standard Specification

New Zealand Standard Specification 1037, published by the New Zealand Standards Institute in November 1952, gives the following spacing of wires for 7- and 8-wire posts.

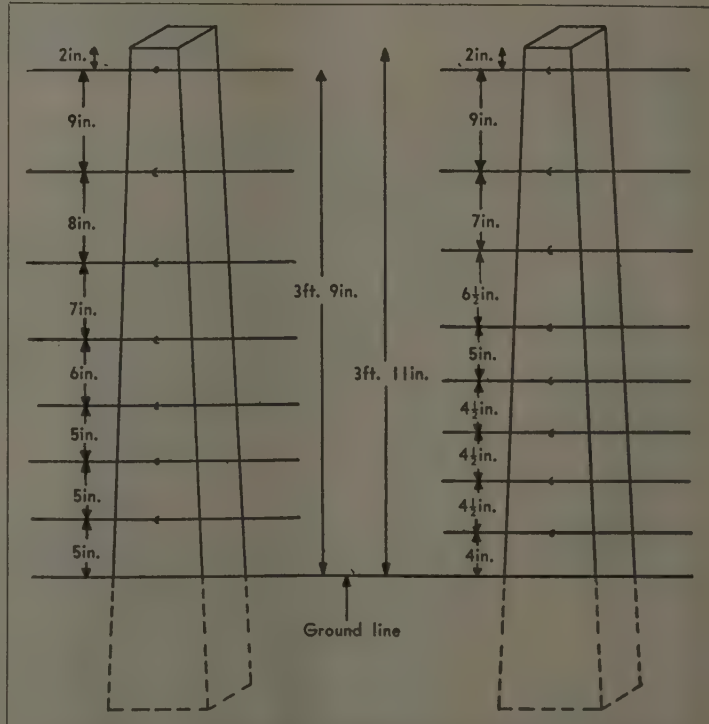
For 8-wire fences: The first hole shall be 2in. from the top end of the post, followed by 7 holes at intervals of 9in., 7in., 6½in., 5in., 4½in., 4½in., and 4½in., measured centre to centre.

For 7-wire fences: The first hole shall be 2in. from the top end of the post, followed by 6 holes at intervals of 9in., 8in., 7in., 6in., 5in., and 5in., measured centre to centre.

Details of reinforcing steel and the quality of the concrete are also stated.

If the wire spacings as set out in the New Zealand Standard 1037 are followed, the bottom wire of the 8-wire fence could be placed 4in. from the ground and that of the 7-wire fence 5in. from the ground, thus making both fences 3ft. 9in. to the top wire.

The wire spacings set out by the New Zealand Standards Institute are not arbitrary but are merely a recommendation.



The New Zealand Standards Institute specifications for a 7-wire fence (left) and an 8-wire fence (right).

Management and Production on a Matamata Dairy Farm

By G. A. BLAKE, Instructor in Agriculture, Department of Agriculture, Matamata

THAT production can be considerably increased on the 80 square miles of Waihou sandy loam surrounding the township of Matamata by an adequate topdressing programme and the adoption of recognised good farming practices is amply demonstrated on the farm of Mr. J. N. Diprose, Hinuera Road, Matamata, where production has been increased by nearly 63 per cent. over the last 4 years.

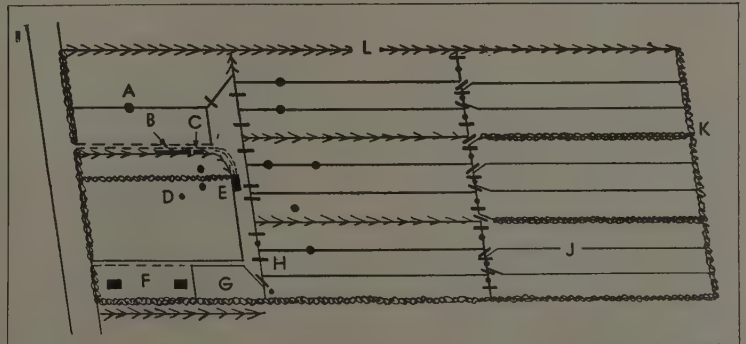
BEFORE 1939 the father of the present owner used only a nominal amount of fertiliser and from 1939 to 1944 no artificial manure was purchased. During this period an annual average of 1750 pigs was brought to bacon weights with buttermilk and whey carted from the Matamata and Hinuera factories. The manure from these animals was collected in a sump and regularly spread over the pastures. So spectacular was the result from this liquid manuring that fertiliser purchases were stopped.

When the present owner took over the property in 1943 rationing of fertilisers was in force, and as no manure had been used in the base years, there was no allocation for this property, but as the result of an appeal 2¼ tons per year for the 60 acres was made available, and this was used in conjunction with the pig manure until 1949, when fattening was reduced and later abandoned when one of the factories changed over to dried milk. From 1943 to 1949 lime was used annually in increasing amounts from 5cwt. per acre to ½ ton in 1949, since when liming has been discontinued as a result of a soil analysis made then of two 7-acre paddocks, the results of which were:—

pH	Calcium	Potash	Phosphate
6.6	+10	Very low	19.4 (Very high)
7.0	+10	Very low	17.2 (Very high)

HEADING PHOTOGRAPH: The type of permanent shelter on Mr. Diprose's farm that prevented the adoption of a central race.

From 1926 to 1940 the same two 7-acre paddocks had been harvested for silage, which was made in a pit located in one of the paddocks, and this probably accounted for the low potash status of these paddocks. Since 1949 the topdressing programme has been 2cwt. of superphosphate and 1cwt. of muriate of potash twice a year, with 1 ton of blood and bone manure per year in addition, used mainly in small quantities over the whole farm. No cropping has been done as yet, but as the fertility of the soil was increased oversowing with 6lb. of short-rotation ryegrass and 6lb. of perennial ryegrass was carried out, with some white clover in those pad-



Plan of farm. A—Troughs. B—Pig sties. C—Barn. D—Water bore. E—Cowshed. F—Houses. G—Orchard. H—Gates. J—New fences. K—Barberry hedges. L—Lawson's cypress and eucalypts.

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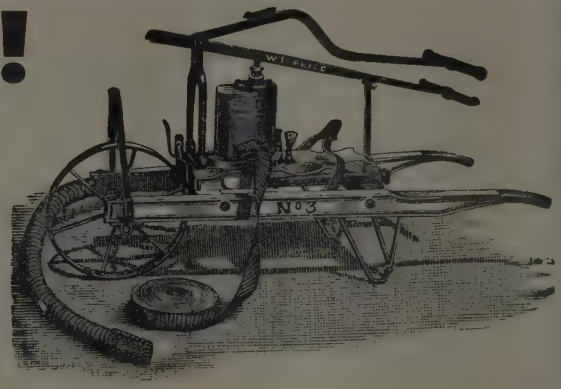

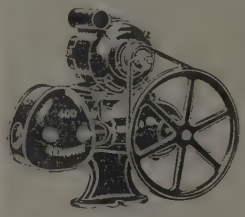

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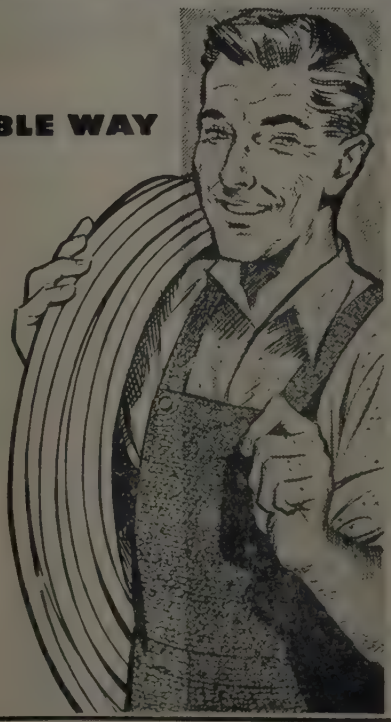

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Left—Break grazing is practised throughout the year. Right—All surplus grass is saved as silage.

docks where this species was deficient.

Subdivision

Before 1949 the farm consisted of 8 grazing paddocks and a bull paddock, but during the 3 following years subdivision fences have been erected until today there are 21 grazing paddocks and the bull paddock. Because of the permanent shelter on the farm a central race system could not be adopted, but each paddock, which measures 14 chains by 1⅞ chains (approximately 2¼ acres), opens into three other paddocks, and each in turn acts as a race to reach those paddocks at the back of the farm.

Management

When some subdivision had been completed the use of the electric fence was instituted. With paddocks only 1⅞ chains wide, the twice daily moving of the fence throughout the whole season occupied little time and in the first year of operation allowed the amount of silage saved to be increased from 14 acres to 21 acres, besides which an extra three cows were milked. Chain harrowing is "almost a religion" on this farm, and the paddocks are harrowed every time they are eaten off by the herd. This has resulted in a very even sward with an absence of unpalatable growths around droppings that are seen on many dairy farms. Since the use of heavier topdressing, the areas under and adjacent to the fencelines showed up so unfavourably that they are now topdressed by hand at the same time as the paddock is done.

Silage only is made on this farm, and every year since 1939, 750 bales of hay have been bought. This hay, with silage, has been used to winter the herd on two or three paddocks of the farm, the rest being closed for spring feed. During the season the herd always returns to the same paddock as used during the daytime, but receives a fresh break of grass. Where summer or early spring feeding with silage is necessary it is fed in the grazing paddock.

PRODUCTION ON FARM AND TOPDRESSING USED

	Total butterfat lb.	Butterfat per acre lb.	Cows milked	Area cut for silage acres	Topdressing used
1939-40	14,746	245.9	48	14	Liquid manure from piggeries
1940-41	14,120	235.3	48	14	
1941-42	13,490	224.8	48	14	
1942-43	11,162	186.0	48	14	
1943-44	9,852	164.2	48	14	
1944-45	13,899	231.6	48	14	
1945-46	10,056	167.6	48	14	Liquid manure plus ¾cwt. of superphosphate and 5cwt. lime per acre
1946-47	10,618	176.9	48	14	
1947-48	11,075	184.6	50	14	
1948-49	12,201	203.0	52	14	
1949-50	14,172	236.2	55	21	2cwt. of superphosphate and 1cwt. of potash twice a year plus 40lb. of blood and bone manure per acre
1950-51	15,252	254.2	55	21	
1951-52	16,490	274.8	57	24	
1952-53	19,847	330.8	63	28	

Bail feeding, using ¾lb. of concentrates per cow twice a day, was commenced in the 1945-46 season, and has been continued up to the present, but the production records do not indicate any real increase from its use.

Up to 1943 no young stock were reared, but since then 16 to 20 calves have been raised annually. These are kept on the farm until December, when they are grazed out and are used for replacements and the balance sold. Herd testing has not been carried out on this farm. The young stock are used to replace losses through old age, deaths, etc., and latterly to increase the herd.

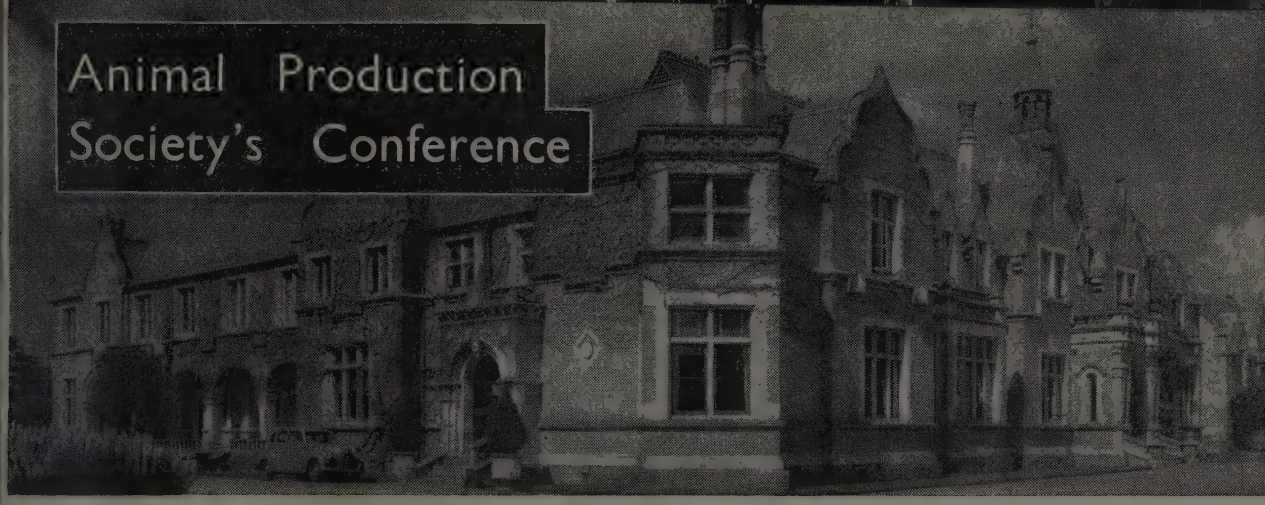
The table above shows the annual production and the rapid increase that followed the use of adequate fertiliser, subdivision, and electric fencing, together with efficient utilisation of the grown pasture and the incorporation into the sward of more productive species through oversowing during the last 3 years.

The production figures given in the table on this page are actual factory returns without taking into account the milk used for rearing calves or for domestic purposes. Production per acre has been based on the total area of the farm, just over 60 acres; but with two houses and gardens, extensive fattening pens, and 1½ acres in orchard, the effective grazing area is slightly over 57 acres. Efficient shelter and a good water supply also play a part in this high per acre production, as the farm is well sheltered with barberry and lawsoniana hedges on the south side of most paddocks, and town supply water is reticulated to concrete troughs in every paddock. The average production on this soil type (Waihou sandy loam) is about 180lb. of butterfat per acre, with many farms producing slightly over 200lb. per acre, but with many from 140 to 150lb. per acre. Its annual requirements are 3cwt. to 4cwt. of phosphate, 1cwt. of potash, and 2cwt. to 3cwt. of lime, and given these, with good pasture utilisation, production can be raised to the 300lb. level.

RESIDENTIAL ANIMAL PRODUCTION CONFERENCE AT LINCOLN

Upper left—The College and part of the home farm of 1264 acres. In the foreground is Hudson Hall and immediately behind it the new refectory block. Upper right—E. G. Griffiths (left), agricultural adviser to the United Kingdom High Commissioner in New Zealand, and Dr. M. M. Burns, Director of the College, discuss the visit to the Ashley Dene property. Middle left—Professor I. E. Coop, conference president. Immediately below—Hudson Hall, occupied in 1953, has accommodation for 163 students and recreational facilities for 300. Bottom left—Federation of Young Farmers' Clubs Memorial Hall, where formal conference sessions were held, was opened in 1953 and is used as a short course lecture hall. Bottom right—On the Ashley Dene property, 878 acres, research includes comparisons of fat lamb sires, crossbred ewes for fat lamb production, wool growth studies, winter feeding of breeding ewes, and mineral and vitamin supplements.

Animal Production Society's Conference



MEETING for the first time in the South Island, the New Zealand Society of Animal Production held its 15th Conference at Canterbury Agricultural College, Lincoln, in February. For the first time, too, the conference was substantially residential, most of those attending occupying student accommodation at the College. Professor I. E. Coop, head of the department of animal husbandry at the College, was president of the conference and the official programme included tours of the college's sheep, dairy, and arable farms and the outlying Ashley Dene Farm, during which there were addresses and discussions on principles of farm management and grassland and animal production.

FOR many members the visit to Lincoln was a return to their Alma Mater and an opportunity to compare the facilities offered students of agriculture today with those of yesteryear. Amenities of the College were made fully available to those at the conference and addresses by College staff on the organisation of College farms and research and development activities indicated the great advances the College has made in recent years in pursuance of the object expressed by the Board of Governors of Canterbury College when the School of Agriculture opened at Lincoln in 1880 with 8 students: "To provide a thoroughly practical education in colonial farming at moderate cost, and to afford facilities for the study of related sciences". On the separation of the College from Canterbury College in 1896 and the appointment of an elected Board of Governors the present designation of Canterbury Agricultural College was adopted. The decision of its founders to establish "a school of agriculture and experimental farm" recognised the double function the College might serve, and both the education and research which have been faithfully carried on and expanded were evident during the recent conference.

Animal Production in the South

Animal nutrition and disease problems have had the attention of the College staff for many years and Professor Coop's presidential address to the conference dealt appropriately with the main animal production problems of the South Island and of Canterbury in particular.

High Country Research

The high country—rugged tussockland, most of it over 2000ft., of which there is an estimated 15 million acres in the South Island—and the need for animal research there were referred to by Professor Coop, who said that this land was occupied in the 50s and 60s of last century at a time when soil science, plant husbandry, and soil conservation were little understood or appreciated. The land today bore the marks of that era and efforts were toward halting the deterioration and even, it was hoped, reversing it.

"With the better understanding of land utilisation possessed by the present generation of runholders and their recent improvement of economic status there is today a new spirit of confidence and of support for research. . . . The first essential to a satisfactory rate of improvement is, I believe, the establishment of a research station in the high country itself. . . .

"From what little evidence we have assembled at the College about the herbage of the high country it appears that the nutritive value is very low. For too long we may have attributed the low lambing percentage, high mortality, and low fleece weights to climatic conditions or natural hazards. Perhaps the generally low level of digestible energy . . . is reducing the productivity of the stock."

The adaptability and productivity of the different types of sheep in the high country were also suggested by Professor Coop as a field for scientific investigation and of economic importance to the runholder. A research station where the soil, pasture, and animal interests could work in close harmony could make a very material contribution to the salvation of the high country.

More problems for his non-existent high country research station were found by Professor Coop in his discussion of wool improvement, the great hope for which must come through environment, that is, through pasture improvement and better husbandry. A factor in wool production which appeared to be fundamental was the antagonism between wool and lamb production and even between quality and quantity of wool per acre.

Increased Lamb Production

The possibility of increases in lamb production was discussed by Professor Coop under the headings of (1) taking lambs to higher weights, (2) carrying more sheep, and (3) increasing fertility.

Taking each lamb to, say, 38lb. instead of 34lb. could be done either by not drafting so early or by using one of the heavier sires, both of which the South Islander did, but it would be true to say that neither method was regarded favourably by those responsible for marketing New Zealand's meat.

Increasing lamb production by increasing carrying capacity had been fairly clearly demonstrated by Lincoln's work on the low-high system of feeding which permitted maximum carrying capacity to be achieved and by the rate of stocking trials at Ruakura Animal Research Station (described in a paper at the conference by Miss D. E. K. Walker). However, only by example and constant demonstration would it be possible to remove from farmers' minds the thought that high carrying capacity plus careful control was definitely not overstocking.

New Zealand's low lambing percentage compared with Britain's was attributed by Professor Coop more to the breeds of sheep used than to environment and management. "In New Zealand", he said, "we have chosen as the basic ingredients of our national flock the Merino of recognised low fertility and three of the best woolled but lowest fertility breeds of England—the Romney, Lincoln, and English Leicester. From the point of view of fertility we could scarcely have made a worse choice. To this must be added almost

HEADING PHOTOGRAPH: Ivey Hall, dignified reminder of the School of Agriculture of 1880.

ANIMAL PRODUCTION CONFERENCE

Illustrations opposite: Top left—Dr. J. P. James (left) vice-president elect, and Col. T. Durrant, president elect, discuss pastures on the light land of Ashley Dene. Upper right (left to right)—J. L. Jebson, Dr. K. J. Mitchell, and Dr. J. F. Filmer at the inspection of cross-breeding research at Ashley Dene. Middle left—F. R. Callaghan and P. W. Smallfield at the inspection of the College farm. Middle right—P. G. Stevens and Professor I. E. Coop discuss the College's stud sheep. Bottom left—Professor P. R. McMahon, Dr. C. S. M. Hopkirk, Dr. J. W. McLean, and Dr. W. M. Hamilton. Bottom right—P. D. Sears, S. L. Green, and Dr. J. Melville.

a century of breeding in New Zealand with no conscious selection for twinning and, in fact, an unconscious selection against it." This contrasted strongly with breeding policy in Britain, where, because of the high value of lamb compared with wool, selection for twinning was consciously conducted and lambing percentages of 150 per cent. and higher were common on fat lamb farms, whereas in New Zealand, and especially in the North Island, 125 per cent. was regarded as very good and the average on fat lamb country was not much above 100 per cent.

Selection for twinning in both sexes was theoretically capable of giving a permanent genetic improvement of over 1 per cent. per annum. It was practicable to select simultaneously for both twinning and milk production and the sooner stud breeders paid attention to this the better, though they should be provided with both the incentive and the technique. The use of pregnant mares' serum to stimulate multiple ovulations, the prevention of pre-natal mortality, and change to breeds of high fertility and high milk production were other possibilities of improvement discussed. Lincoln's experience with the Border X Corriedale (and Border X Merino) crosses since the experiment began in 1950 was promising and showed at least a 20 per cent. increase in lambing percentage.

"As far as the fat lamb farmer is concerned," said Professor Coop, "I believe that the use of these first-cross ewes, combining as they do high fertility and good milk production, instead of purebred ewes, offers the easiest and most practicable method of increasing production. . . . Until we can get the lambing percentage up to 150 per cent., lamb production per acre in New Zealand is bound to be disappointing in relation to the pasture which we can grow."

Lamb and Hogget Thrift

Lamb mortality before weaning, amounting to about 15 per cent., most of which occurred at or immediately after lambing, was a problem in the South Island as it was in the North. Findings arising from the work being done on this subject by the Gisborne Veterinary Club and Wallaceville Animal Research Station, described in two papers at the conference, must be applicable generally, at least in part.

"It is to be hoped that some positive results may emanate from the work recently commenced at Ruakura and Wallaceville on lamb and hogget unthrift," said Professor Coop, "for the causes in the two islands are probably basically the same. This unthriftiness in young stock starting before weaning and continuing until the following spring is indeed one of the major problems of the industry."

In referring to one known cause of unthrift, the deficiency of one or more trace elements, Professor Coop mentioned the provision of diagnostic centres in the South Island. By research and critical observation the veterinarian and his diagnostic centre would in the course of time materially assist first in determining what the diseases were and then in solving the problems which even the non-veterinarian must admit were very difficult indeed.

Memorial Address on James Little

Memorial addresses on outstanding personalities in New Zealand's agricultural industry have been a feature of conferences of the Animal Production Society, and this year's address on "James Little and His Corriedale Sheep," by P. G. Stevens, senior lecturer in animal husbandry at Lincoln, was appropriately given at the College at which in 1950 the first International Corriedale Congress was held.

James Little arrived in New Zealand from Scotland in 1863 and began his experimental breeding with Lincoln and Merino sheep on Corriedale, the North Otago property of Dr. Webster, in 1868, shifting to Allandale in North Canterbury in 1878. Mr. Stevens's study of Little's 57 years of active sheep-breeding in New Zealand is a valuable contribution to the history of the Corriedale breed and the evolution of the meat and wool industry in New Zealand.

Papers and Speakers

"An Economic Survey of the New Zealand Sheep Industry"—W. L. Keen.

"Meat Production per Acre"—Miss D. E. K. Walker.

"The Fleece as a Factor in Sheep Adaptation"—Dr. A. E. Henderson.

"The Genetics of Some Aspects of Fertility in Sheep"—Professor A. L. Rae.

"Neo-natal Mortality of Lambs in the Gisborne Area"—D. McFarlane.

"Bacteriological Studies of Neo-natal Mortality of Lambs"—W. H. Hartley and Miss B. W. Boyes.

"Some Animal Production Problems of the South Island"—Professor I. E. Coop.

"James Little and His Corriedale Sheep"—P. G. Stevens.

"The Chemical Control of Ecto-parasites of Sheep and Cattle"—W. S. Allan.

"Fat Lamb Production Costs: Their Nutritional Basis"—L. J. Lambourne.

"Productivity in Sheep, Mainly Relating to Wool Growth"—D. S. Hart.

"Techniques and Results of Low Temperature Bull Semen Storage"—Dr. J. P. James.

"The Effect of Some Endocrine Factors in Mammary Gland Growth and Lactation"—Dr. D. S. Flux.

"Studies of Molybdenum in the Soil"—Dr. W. B. Healy.

"The role of Molybdenum in Plant Nutrition"—Dr. E. B. Davies and J. L. Grigg.

"Molybdenum in Animal Health in New Zealand"—Dr. I. J. Cunningham.

"The Role of Rumen Microflora in Ruminant Metabolism"—Dr. L. Gall.

"Factors Affecting the Non-fatty Solids in Milk, with Particular Reference to the New Zealand Town Milk Industry"—Professor I. L. Campbell.

"Intake Studies"—J. C. Percival and R. J. Lancaster.

Conference Papers and Proceedings

Subjects of papers at the conference and names of speakers are listed at left. Papers and discussions are printed in the "Proceedings" of the conference, which are sent to financial members and may be ordered (15s. per copy) from the secretary of the Society, C/o Ruakura Hill Country Station, Private Bag, Frankton Junction.

Officers: 1956 Conference

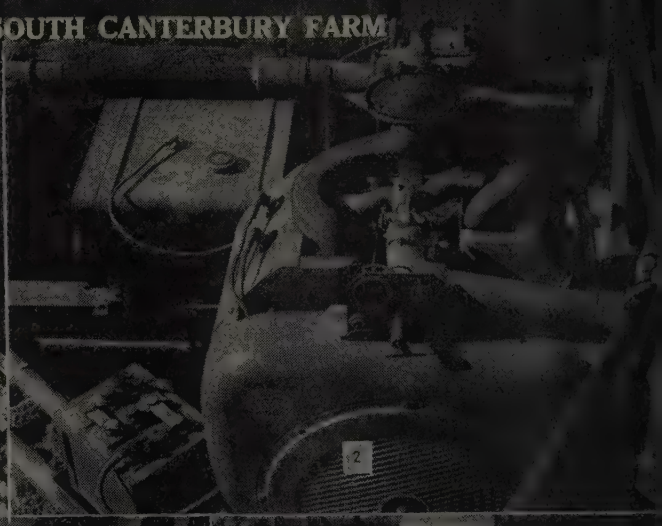
Officers of the Society for 1955-56 are: President, Col. T. Durrant; vice-president, Dr. J. P. James; hon. secretary-treasurer, Miss D. B. Filmer; committee, Professor I. E. Coop, Professor A. L. Rae, D. Smith, and Dr. K. J. Mitchell.

The incoming committee was directed to arrange the holding of the next conference at Massey Agricultural College in February 1956.

—*G.J.N.*

All photographs by R. C. Blackmore.

ROTARY HOE ON SOUTH CANTERBURY FARM



1—Tubular drawbar and tractor hitch. The battery is mounted on the double tubular stays. 2—Air-cooled 31 h.p. engine mounted over the tubular drawbar. Easily accessible controls are mounted above the fan cowling. The bar on which the hoe pivots runs along the back of the illustration. 3—Two-to-one reduction gearbox mounted direct to crown wheel housing. The universal jointed drive from engine to gearbox is at right middle. To the left and behind the gearbox is one of the mountings of the hydraulic lifting ram. 4—Wheel mounting and the frame and drawbar stay construction. 5—Hydraulic ram, attached to a support which is welded on to the frame at right and to the hoe cover at the top left corner.

Modified Rotary Hoe on South Canterbury Farm

SINCE the introduction of the farm tractor many excellent tillage implements have been introduced which have enabled farmers to increase the production from their land with a minimum of time and effort. These new machines are the outcome of years of research both by agricultural engineers and practical farmers. Outstanding among these new products has been the rotary hoe. This article by H. A. Arthur, Fields Instructor, Department of Agriculture, Timaru, describes how a South Canterbury farmer has modified one of these excellent tillage implements to suit his own requirements.

THE hoe is a 6ft. standard heavy type that formerly bolted direct to the tractor and was driven off the power take-off. Two pieces of 2in. steel shaft act as a pivot to allow the hoe to lift out of the ground. These are centred on the crown wheel drive shaft and are welded on one side to the crown wheel housing and on the other side to the chain cover which is extended out sufficiently to rest on the frame. The outer extremities of these shafts rotate in plain bearings bolted on top of the frame.

The frame is made up of 5in. x 2in. H iron and the drawbar of 4in. steam pipe has two stays of 1¾in. steam pipe on either side. The stays and drawbar are welded to the frame with strengthening gussets on the outside stays.

The engine used is a 31 h.p. air-cooled unit running at 2000 r.p.m. With the engine running at 2000 r.p.m. a reduction gearbox was found necessary, so a power take-off reduction

HEADING PHOTOGRAPH: The rotary hoe described. Below—The machine working a paddock which had been ploughed and left until the grass was growing through strongly.

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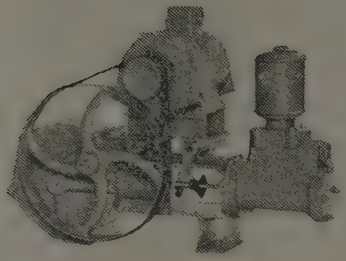

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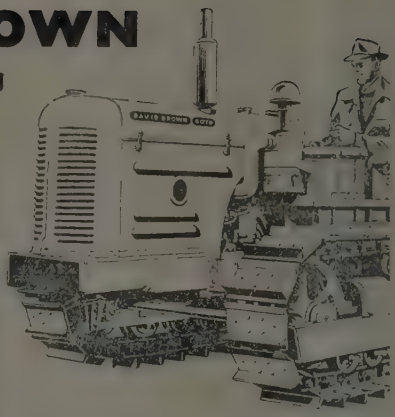

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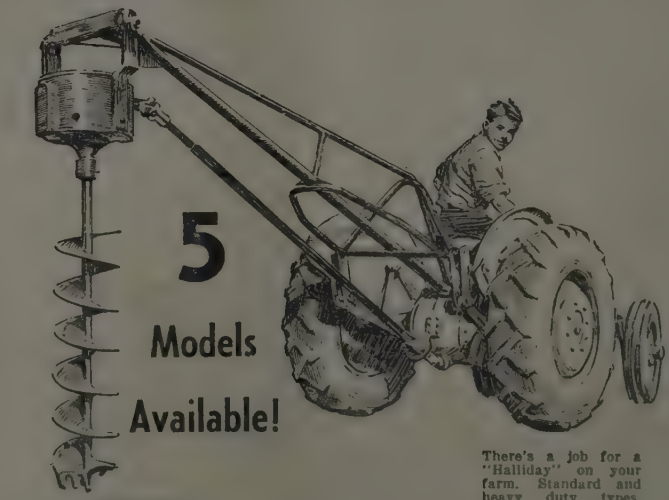

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Working down a paddock left in the furrow. The growing grass and the dead and decaying material have been distributed throughout the worked ground. A feature of this working is that the finer particles are at the bottom of the worked ground (about 6in.) and the coarser particles on top.

gearbox (about 2 : 1) of a well-known tractor was used with minor alterations. The pinion was fitted to the gearbox, which was then bolted in place to the crown wheel housing, existing holes being used through which the hoe was formerly bolted to the tractor. The engine was coupled to the gearbox by a single universal joint to allow for any slight twist the frame might take on rough ground. Other reductions built into the hoe (that is, crown wheel and pinion and chain drive sprockets) amount to about 8 : 1, so that with the motor running at 2000 r.p.m. this gives the rotor a speed of 125 r.p.m.

The wheels take 600 x 16 tyres and are placed inside the frame between the hoe and engine to give correct balance on the drawbar when the hoe is lifted out of the ground. The axles are bolted to short pieces of channel iron (6 x 4) which are in turn welded to the main frame.

The wheels, frame, and drawbar are all in a fixed position.

Depth is adjusted by the tractor's hydraulic ram, which is mounted on the hoe between two links, one welded to the cover over the blades and the other welded to the frame. This lift is controlled from the tractor seat and remains in any desired position from full depth about 7in. to travelling position when the blades are about 1ft. clear of the ground. The hoe can be lifted clear of the ground at corners if desired.

These modifications have resulted in a wonderfully versatile tillage implement. With the tractor in low gear at full throttle (2½ m.p.h.) the soil is left in a fairly rough condition suitable for a fallow. At this speed just under 2 acres per hour can be accomplished.

At half throttle (1¼ m.p.h.) a very fine tilth is the result, with stubble and trash well chopped up and thoroughly mixed in with the soil. This is at the rate of just under 1 acre per hour.

The tractor, of course, is not working hard at any throttle setting. Even at a slow idle speed the hoe has a propelling effort when it is working.

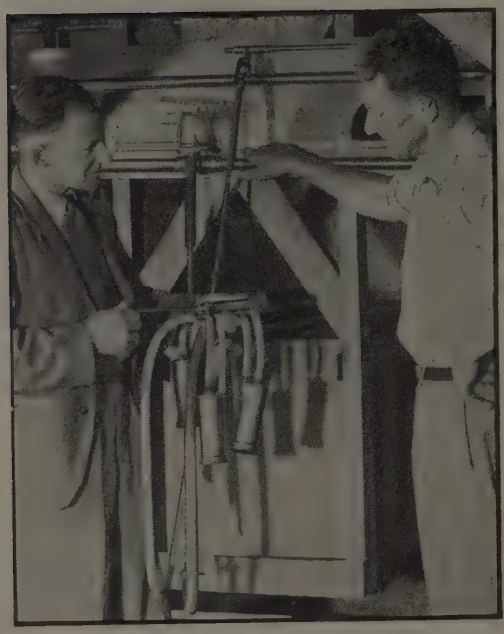
An indication of the efficiency of this machine was recently demonstrated on a barley stubble paddock where the straw was thick on the ground. One stroke left the ground in excellent fallow condition with the straw well distributed through the lumpy soil. On the next stroke the ground was ready for sowing with the straw chopped up fine and distributed throughout the full depth. This result could well have been achieved in the first operation if the tractor had been driven at a slow speed.

Next, the hoe was put into a paddock which had been ploughed and left in the furrow for some time and the grass was growing along each furrow. In this instance the hoe left either a rough finish to receive further weathering or was worked down ready for sowing. One notable feature was that the finer particles were at the bottom of the furrow where they are required for proper consolidation and the coarser particles were on the top.

To show that the machine was capable of really hard work it was put into tall cocksfoot on the roadside, where it left all the trash mixed with the soil to a depth of several inches.

The 5in. by 2in. H iron frame. The method of attaching drawbar and double stays is shown. Strengthening gussets can be seen on the stays and drawbar.

Care of Livestock during May



Contributed by the Animal Research Division

MILKING MACHINE OVERHAUL

AS soon as the cows have been dried off arrangements should be made for the milking machine to be overhauled by an expert. Do not install complicated gadgets, but make sure that all parts of the machine are working efficiently. This will not only ensure rapid, trouble-free milking, but is likely to increase production and will help to reduce mastitis.

BLOOD POISONING IN HOGGETS

Blood poisoning in hoggets grazing on turnips is becoming an increasingly important problem. Deaths occur from infection with the blackleg organism, which probably gains entry through the mouth. An excellent vaccine, which confers very good immunity, can now be bought in New Zealand. On properties where there have been previous losses hoggets should be vaccinated a fortnight before they are placed on turnips. The nearest Veterinarian or Livestock Instructor should be consulted about the method of vaccination.

AUTUMN-SAVED PASTURE

In most districts there is still time to provide good winter grazing by shutting up paddocks and letting them grow during autumn and early winter. Having some pasture cover on paddocks before the first frosts will assist pasture growth during winter. Autumn-saved pasture is invaluable for early calving cows. It also provides the best insurance against sleepy sickness in ewes. If necessary, silage should be fed to cows now to enable some paddocks to be shut up. Once the ewes have been tupped they are all the better for being done fairly hard until 3 or 4 weeks before lambing. This also will enable some paddocks to be spelled.

UNTHRIFTY CALVES

The best feed for calves is good, fresh pasture and this can be provided by rotating the calves through the cow paddocks. Good-quality hay is necessary to supplement the sappy young autumn pasture. At the first sign of unthriftiness calves should be drenched with phenothiazine, being given the full dose recommended on the label. Drenching, however, will not be effective unless the calves are properly fed.

PREVENTION OF SUCKING BY CALVES

Sucking of each other by calves is a habit which should be broken as soon as it is detected. The insertion of a bull ring is effective in most cases.

INOCULATION OF DOGS AGAINST DISTEMPER

Distemper in many dogs can be prevented by vaccination. This is best done when the pups are 3 to 4 months old. The virus has a short life and must be specially ordered. The Veterinarian should therefore be notified at least a month before the pups are to be vaccinated.

RED WORMS IN HORSES

Red worms can seriously reduce the efficiency of working horses and are responsible for many deaths in foals. Phenothiazine is a very effective remedy, but is best given under veterinary supervision, as in certain conditions it may prove dangerous. Treatment should be administered before winter.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during February and for the 7 months ended 28 February 1955, with comparative figures for the same month and 7-monthly period of 1954, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage Inc. or dec.
February 1955	14,065	293	14,358	—
February 1954	12,141	294	12,435	—
Increase or decrease ..	+1,924	—1	+1,923	+15.464
7 months ended 28/2/55	126,192	2,374	128,566	—
7 months ended 28/2/54	121,930	2,376	124,306	—
Increase or decrease ..	+4,262	—2	+4,260	+3.427

Butter in store at 28 February 1955 was 30,119 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage Inc. or dec.
February 1955	8,444	2,072	10,516	—
February 1954	11,030	36	11,066	—
Increase or decrease ..	—2,586	+2,036	—550	—4.970
7 months ended 28/2/55	62,078	15,786	77,864	—
7 months ended 28/2/54	75,981	134	76,115	—
Increase or decrease ..	—13,903	+15,652	+1,749	+2.297

Cheese in store at 28 February 1955 was 30,525 tons

If these figures are converted into butterfat equivalent, there is an increase of 3.183 per cent. in butterfat graded for the 7 months as compared with the corresponding period of the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place from time to time they are not necessarily a true indication of production trends.

Winter Management of Pastures

Seasonal Notes by the Extension Division

ON dairy farms, fat lamb farms, and hill country farms much can be done by the intelligent manipulation of stock in relation to the pastures during winter to provide more and better grass when it is most needed in late winter and early spring.

DAIRY FARMS

WINTER pasture management on the dairy farm can have a marked effect on the butterfat production of the new season. Autumn-saved grass gives the milkers a good start, but such grass will last only a few weeks and too often the milkers are on short rations until spring growth begins in earnest. Winter pasture management should aim therefore at having good grass coming along in a succession of paddocks, the first to be ready for grazing as the last of the autumn-saved grass is finished. The best and surest way of achieving this aim is to rotate the dry stock through the winter round the rest of the farm, feeding adequate quantities of silage and hay in each paddock in turn to supplement the low grass production at this time of the year. Each paddock thus gets a heavy dressing of dung and urine and when harrowed and closed will make surprisingly good fresh growth. With experience a rotation to suit the farm can be worked out so that the first paddocks required to follow on after the autumn-saved grass will have a sufficient spell to make the necessary growth. Nitrogenous fertilisers can often be used with advantage to get more and better grass on these winter-spelled pastures.

SHEEP FARMS

On both fat lamb farms and on hill country good grass is wanted in late winter and early spring for conditioning the ewes for lambing and in early spring for the lambing itself. Here again much can be done by intelligent grazing management to have the grass when it is most required. Where crops such as swedes or chou moellier can be grown there should be no problem; the crop provides the conditioning feed for the ewes and the pastures can be spelled to save feed for lambing. In planning the crop acreage in relation to the stock to be wintered it is as well to remember, however, that winter pasture growth is slow and with a spell of up to 2 months sheep pastures will not get away.

It is where crops are not or cannot be grown that pasture management on the sheep farm can do much to provide better feed for the ewes coming up to lambing and for the lambing itself. This is where, too, autumn mob stocking of the sheep can be made to pay dividends. To provide extra feed before lambing the autumn growth can be saved in several paddocks by leaving them out of the rotation. In another group of paddocks intended for the early lambers the rotation is speeded up so that these paddocks are never hard grazed in winter. Then when the ewes are concentrated on the autumn-saved grass before lambing these lightly grazed paddocks are spelled. They should come away quickly and be carrying good feed for the early lambers. Experience will help to develop a sound system of late autumn and winter pasture management on the sheep farm to provide good grass for conditioning the ewes for lambing and for the lambing itself, based on the fact that pastures must be spelled to make good growth, especially in winter.

—C. J. HAMBLYN

* * *

PASTURES FOR SEED

THE most critical period in the life of a pasture is in the early stages when it is in the process of establishing and anything that can be done in the way of management to assist the establishment of the pasture should be employed. Winter grazing will depend largely on circumstances, but where seed production is planned grazing of all new ryegrass stands should be light. Heavy winter grazing of a young stand is undesirable, especially when conditions are wet. Relatively concentrated stocking over a short period should be employed rather than a light stocking over a long period, and grazing should never be so severe as to defoliate the plants entirely. On large areas it is preferable to feed off in breaks. This applies even more to the slower-establishing plants such as *Phalaris tuberosa* and timothy; cocksfoot is better left ungrazed. On second-year or older ryegrass-white clover stands where clover seed production is intended fairly hard winter grazing can be carried out. The closeness of the grazing will depend on the vigour of the stand and the soil type. On the heavier soils grazing can be fairly severe. This management favours the clover and checks the ryegrass. Most other species require reasonable winter grazing, but it is better not to graze cocksfoot, except in those older stands where it is desired to clean out the bottom. Cattle are best suited for this purpose.

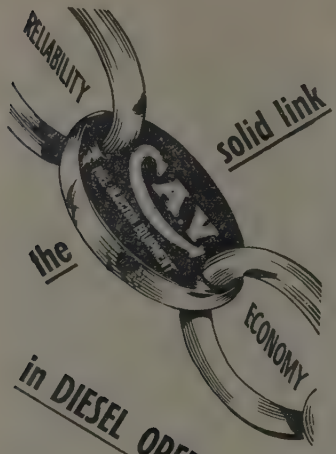
—R. JOLLY

* * *

CULTIVATION FOR FORAGE CROPS

VARIATIONS in soil types and seasonal conditions make it impossible to lay down hard-and-fast rules regarding cultural practices and therefore a careful study of these factors is necessary when planning to work land for spring crops. However, irrespective of soil and climate there is no disputing the value of a winter fallow. Sometimes the land is skimmed or hustled before deep ploughing in winter, but spring crops in Canterbury are generally sown on one ploughing, which should be carried out in early winter. This facilitates thorough weathering and improves soil structure to a degree that could not be accomplished by any amount of hasty cultivation. The choice of implements and the cultivation necessary will be governed by local conditions, but whether the disc or grubber is the choice in early spring, the first cultivation should be shallow, with later work designed to develop a good tilth to the bottom of the furrow. Only practical experience can teach the correct times to use cultivating implements. If the soil is worked while it is too wet, it becomes harsh; if it is left in the furrow for too long, later working becomes difficult. The aim should be to begin cultivation as soon as the land is sufficiently dry to carry the tractor. For forage crops such as rape or turnips frequent working with roller and tine harrows is advisable during the later stages of preparation of the fine, firm seed-bed demanded for rapid germination of these small seeds. In dry seasons rolling 10 days before drilling assists in keeping moisture right to the surface, but after sowing only light harrows should be used, for once moisture is brought to the surface it is soon lost unless the topsoil is left loose. The ideal seed-bed for spring-sown cereals and pulse crops is a deep tilth that is firm and fine underneath but still has some rubble on the surface, and grubber, roller, and harrows will generally be the most useful implements. If these cash crops are to be sown after rape, preparation of the seed-bed should be comparatively simple if the land is ploughed as soon as feeding off is finished. If, on the other hand, the spring sowing is to follow a crop such as turnips or chou moellier, timely cultivation will be of the utmost importance. After winter tramping by stock the soil is frequently harsh and either skimming or hustling followed by thorough cultivation before deep ploughing will usually be well worth while. If these operations are carried out, cultivation after deep ploughing should present few difficulties.

—E. G. SMITH



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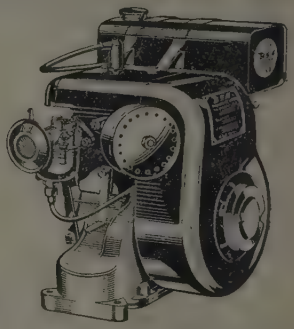

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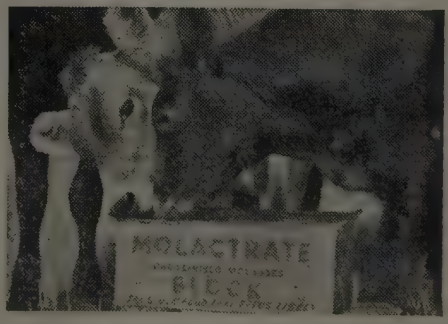

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By A. LONGWILL, Superintendent, Pig Industry, Department of Agriculture, Wellington

USUALLY pig numbers are greatly reduced at this time of year because of the failing supply of dairy by-products for feed. Consequently it is a time when a good deal of preparatory work can be done to improve husbandry and future returns. Every opportunity should be taken to ensure that all pigs which can be finished before the end of the season are sold at profitable weights. Any spare time can be well occupied with improvements to housing and working facilities at the piggery. Sows farrowing during May and June can be given the attention they warrant and careful management and observation before and after farrowing will help to ensure a good crop of pigs and hence a foundation for increased production in the coming season.

PROBLEMS in the piggery just now usually have some connection with the failing food supply for the pigs. The breeding stock can still do quite well on grass and a small amount of milk or concentrates, but the pigs from summer litters are not just at the right stage and are "hanging fire". The problem is should they be finished, carried over as stores, or sold as underweight porkers or stores.

Porkers Should be Taken over 60lb.

Store markets vary locally and it is impossible to dogmatise on what is the best course to follow. Generally, however, at this period the price of store pigs is well below pork schedule and it will pay to take pigs born up to early February to pork weight before the end of the dairying season.

There is a substantial discount usually not less than 3d. per lb., on porkers under 60lb. and even though the lower schedule now ruling for export porkers does not leave much scope for the purchase of meals, the prices of which have not been reduced correspondingly, use of meals is still not economically impossible.

A cheap source of food to replace the failing dairy by-product supply will help and is indispensable to the most economic solution of this problem and no source readily available to most farmers is more suitable than a home-grown crop of fodder beet.

Pigs Fatten on 2 Food Units per Day

Practical trials have shown that satisfactory results may be obtained in finishing porkers to 100lb. liveweight (or more if desired) on 1 gallon of skimmed milk and 1lb. of meal per day with fodder beet to appetite. Actually no milk is necessary as long as the meal fed contains adequate protein, but at least 2 food units (1 food unit = 1lb. of meal or 1 gallon of skimmed milk) per pig daily of concentrate-quality food must be fed.

Higher levels of meal feeding are sometimes recommended overseas, but in comparative trials carried out last year the growth obtained on the feeding level quoted was as good as that where double the rate of meal was used. The economic limit with meal would appear to be 1lb. per pig per day where 1 gallon of skimmed milk

HEADING PHOTOGRAPH: Careful preparation of the sow and provision of good farrowing accommodation will help to ensure a good spring pig crop.

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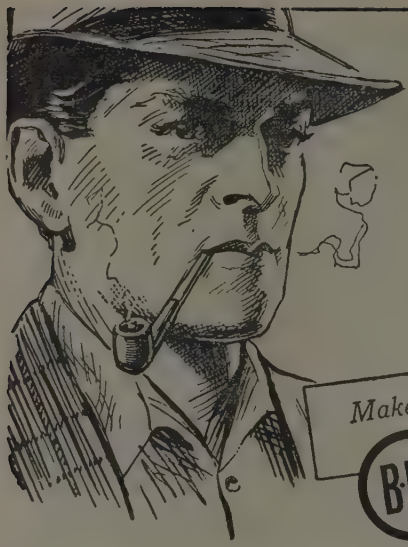

Two Heads are Better Than One—

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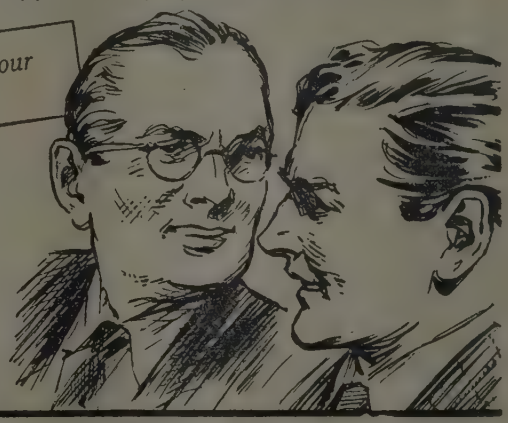

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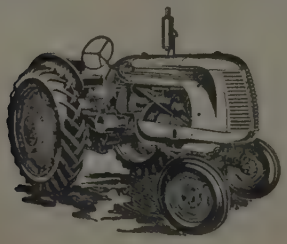

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is fed or up to 1½lb. of meal when skimmed milk falls to ½ gallon per pig per day.

In some districts the price schedule may be more attractive for baconers and where this is so and a crop is available it may be possible to take larger pigs up to baconer weight. The same amount of concentrate-quality foods only is required, increases in the fodder beet fed ad lib. taking care of the increased feed requirements.

What has been said about the use of fodder beet for finishing pigs presupposes that a crop has been grown during the past season. If no crop of this quality is available (maize is suitable, though the cost of production will usually be higher per food unit produced than with fodder beet), pigs may have to be sacrificed. This should serve to stimulate the necessary action of ordering seed and fertiliser and preparing the ground for a crop next year. One acre well manured and cultivated will produce 30 tons of fodder beet, enough supplementary food for 5 sows farrowing in May/June, 1 boar, and 10 store pigs being carried over to deal with the early flush of milk.

Fodder beet being fed out. Good weaners may be finished to porker weight before the end of the dairying season on a daily ration of 1 gallon of skimmed milk, 1lb. of meal, and fodder beet to appetite.

New Buildings

If new buildings will be required to enable the pigs budgeted for next season to be handled and fattened efficiently, no time should be lost in getting these erected. Concrete work especially should be finished before frosts begin and holes in the pig runs should be filled with gravel, sand, pumice, or sawdust before wet weather makes them mud holes again.

During the last year new pighouse plans have been developed and published and these are available through the Department of Agriculture or pig councils. Farmers are advised to study the recently approved plans before going ahead with a building programme.

Improvement to Buildings

Existing buildings could, in many cases, be made more efficient. Sarking of roofs or lining of houses to increase their resistance to the transfer of heat both outward in cold weather and inward in hot, addition of shutters to give greater control over ventilation, and relaying of sleeping floors with coke breeze or other lightweight aggregate to increase their insulating capacity are the most useful improvements after the more obvious repairs to leaks and draughty walls have been attended to.

The installation of a heat lamp brooder placed 7in. forward of the central position in an existing 8ft. x 8ft. farrowing house can be a successful arrangement, though generally it is recommended that at least one farrowing house on the round ground plan should be built. Plans of this type of house are available on request. Sows could be farrowed in turn in the round house and transferred to one of the existing farrowing houses when necessary to make room for the next sow.

Improving Handling Facilities

Where good handling facilities including draughting yards, crush race and head bail, weighing crate, loading ramp, and foot bath are not already installed the erection of such facilities before next season will be a very good investment. The exact layout of such amenities is very much an individual problem depending on each layout and site. A plan showing one layout of yards was published in the July 1954 issue of the "Journal". This may give some idea of how the problem may be tackled on each farm, but the assistance of an advisory officer with a wide experience of planning such layouts may be sought to overcome particular problems.

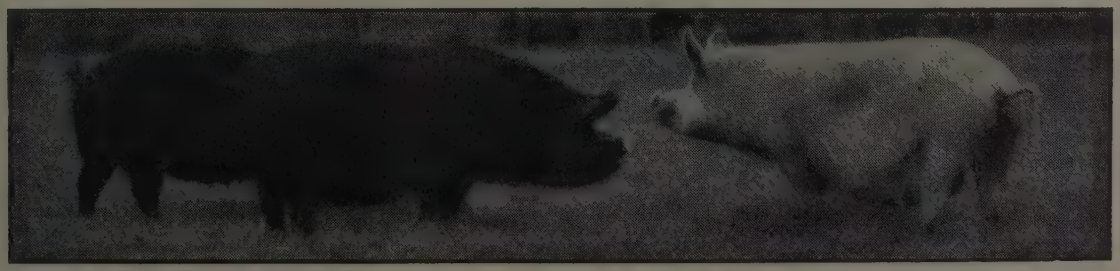
The essentials to aim at in planning the yards are:—

A connecting race should provide easy access from each pig house to the yards.

A holding yard leading either directly or through weighing or crush race to the loading ramp, which preferably should have a covered holding pen on a loading platform.

Weighing race with crate and scales.

Yard space for holding pigs after weighing, etc. This should preferably be subdivided and a draughting gate provided to enable pigs to be



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The sleeping area of a high-roofed, open-fronted fattening house enclosed with straw bales for warmth in winter.

draughted back to the pens or out to the loading ramp.

Foot bath. If this is placed opposite the weighing race and the whole is roofed over, it will be most convenient.

Crush race and head bail.

Meal house or meal bins close to milk container.

Preparation for Winter Farrowing

The bulk of the farrowings for the start of the new production season should occur in the next month or two and all the necessary preparations for this should be in hand.

In the arrangement of farrowing dates the best policy is to farrow sows over a fairly concentrated period 6 weeks ahead of the calving period of the dairy herd.

Where maiden sows are being brought into the herd they should be among the first to farrow. They must be accustomed to being handled and be put into their farrowing quarters a fortnight before the due dates so that they will have settled down. Over this period, too, the ration should be gradually increased rather than have a too rapid increase after farrowing.

Maiden sows will generally not be so fat that feeding before farrowing will be undesirable. If older sows have become too fat, there is no need to hand feed them before farrowing, but they should have free run out from the farrowing house and be encouraged to take exercise.

Pregnant sows are liable to become constipated and a careful watch on the state of their bowels is necessary to avoid losses at farrowing. Inclusion of bran in the ration at this time has long been advocated, but supplies are not readily available to pig farmers today. Grazing on good grass or other green-feed is a more satisfactory policy for North Island dairy farmers. Addition of a little molasses to the liquid feed will assist and in more difficult cases medicinal paraffin may be used as an intestinal lubricant.

When little milk is available the addition of 2oz. of a mineral mixture per day to the sow's ration is advisable. A simple mixture is 40 steamed boneflour : 40 ground limestone : 20 salt (all parts by weight) with the addition of 2oz. of potassium iodide per 100lb. of mixture where the birth of hairless pigs indicates that this mineral is necessary.

Control over Sow at Farrowing

It is well known that some sows will farrow out where there is good cover and they can make a nest and rear all their piglets. Almost all farmers, however, have had the experience (though they may prefer to forget it), of sows farrowing out at this time of the year and losing all their litters through chilling or even drowning in pools.

As a result of what is known today of the optimum conditions for survival of baby pigs there can be no doubt that the sow should be confined in a house specially designed for farrowing. It is no use bringing her in only a day or so before farrowing. She must have time to settle down and shortly before farrowing starts the heat lamp should be brought into use. A warmed zone in a near-central position (as in the round farrowing house) maintained at 75 to 77 degrees F. is the best insurance against losses at farrowing: If the sow becomes excitable as farrowing approaches, it may be necessary to fix a door across the entrance to close her in the house. To prevent the piglets from wandering past the entrance to the warmed zone, wooden blocks should also be placed on each side of the baffle before farrowing begins.

Reduced Ration

If the condition of the sow has been built up in early pregnancy and maintained throughout, she will not suffer, but on the contrary benefit, from a reduction of her ration for a couple of days before and after farrowing. The ration should be laxative and exercise

["New Zealand Farmer"

Laying coke breeze (shown above) or other well-insulated sleeping floors will pay good dividends.

with free access to grass and drinking water should be provided.

If available pasture is of poor quality, other green or root feed should be provided in controlled quantities at up to 20lb. per day. This amount of fodder beet together with 2lb. of bran or pollard per day with a gallon or so of milk, if available, will be an adequate daily ration for a few days before farrowing. On the day of farrowing and for 24 hours after all solid food should be withdrawn unless a light bran mash is available. Plenty of clean drinking water should be offered.

Watch on Sow

Careful observation of the sow to ensure that no complications occur is essential. Milk fever, if it occurs, usually develops suddenly and an early injection under the loose skin of elbow and flank of calcium boro-gluconate may be necessary to save the sow Milk fever may usually be distinguished from other conditions which may sometimes be confused with it by the fact that the sow's temperature is normal (102.5 degrees F.) or slightly subnormal.

Abortion may occur and if it appears that this has not been due to accident, sudden change of diet, or sickness of the sow, professional assistance should be sought to diagnose whether some specific infection is responsible and if so, to advise on the best method of dealing with the problem.

If the afterbirth is not properly expelled, a full dose of opening medicine should be given and if this is not effective, veterinary assistance should be summoned to clear up the trouble and avoid infection of the womb. This organ may occasionally be everted as a result of straining after farrowing due to pains or constipation or through the attached afterbirth being trampled on. This is a serious accident which usually ends in death unless the organ is promptly replaced. The sow must be suspended by the hind legs and the everted womb thoroughly cleaned before it is returned to its normal position. Two or three tape stitches should be inserted and after the organ has had a chance to contract and become more comfortable, in say ½ hour, the sow may be released. Unless considerable delay would be entailed it is advisable to secure a veterinarian for this operation.

Mastitis may occur after farrowing. Close examination is warranted if the udder appears tender and the sow refuses to allow the pigs to suckle, and veterinary treatment should be given without delay. As the sow does not have a single teat canal, it is not possible to inject penicillin direct as is done in the treatment of mastitis in cows.

Gradual swelling of one or more quarters may be due to actinomycosis or tuberculosis and a veterinary diagnosis should be obtained.

Sows which are fat at farrowing but which draw on this fat in feeding their litters may develop a disorder known as acidosis. An affected sow becomes dull, loses appetite, becomes constipated, and "fades away", becoming very sluggish. As soon as the first symptoms appear and the litter are evidently not getting their reasonable amount of feed from the sow 2lb. of molasses should be included in the sow's daily ration and the amount of concentrate, particularly maize or other grain, should be increased. If this does not effect early improvement, veterinary advice should be sought without delay.

High-altitude Snow Tussock Grassland in the South Island

THE Tussock Grassland Research Committee published in the December 1954 issue of the Agricultural Section of the Journal of Science and Technology its review of the high-altitude snow tussock grassland of the South Island. This review summarises what is known of the scientific aspects of high-altitude snow tussock grassland.

The review has been reprinted and free copies are available on request from the Department of Scientific and Industrial Research, Wellington, and from the offices of the Department of Agriculture at Blenheim, Christchurch, Ashburton, Timaru, and Dunedin.

Radio Broadcasts to Farmers

RADIO broadcasts to farmers will be given from Station 2XA Wanganui during May at 8 p.m. as follows:—

5 May—"For the Countrywoman", by Mary MacDonald.

12 May—"The Radio Vet.", by S. Jamieson, Veterinarian, Department of Agriculture, Wanganui.

19 May—"The Feeding of Crops to Pigs", by C. M. Bailey, Supervisor, Taranaki District Pig Council.

26 May—"Y.F.C. Activities in Wanganui District", by A. K. Booth, Instructor in Agriculture, Department of Agriculture, Wanganui.

Winter Show Dates

*31 May, 1, 2, 3, 4, 6, and 7 June—Waikato A. and P. at Hamilton.

*3, 4, 6, 7, and 8 June—Otago A. and P. at Dunedin.

8, 9, 10, and 11 June—Whakatane A. and P. at Whakatane.

*15, 16, 17, and 18 June—Taranaki A. and P. at New Plymouth.

16, 17, and 18 June—Te Kuiti and District A. and P. at Te Kuiti.

* The Department of Agriculture exhibit will be staged at this show.

Investigations of Dryland Farming Methods

By S. D. WALKER, Research Officer, Department of Agriculture Winchmore Irrigation Research Station

DURING the past decade many farmers on the light lands of Canterbury Plains have greatly increased production by the adoption of improved systems of farming. The basis of these methods is more productive and longer-lasting pastures made possible by a sound rotation, Certified seed of suitable species, and adequate topdressing with lime and phosphate. Chemical control of grass-grub and subterranean caterpillar has allowed the full potential of such pastures to be developed.

AT Winchmore Irrigation Research Station 50 acres of non-irrigated land are being used to investigate some aspects of these dryland farming methods.

Systems of Management

This area of Lismore shallow silt loam soil type has been divided into two self-contained farmlets. On one management follows fairly standard light land practices. Fat lamb farming is the main activity, but forage and cereal crops are grown. The pastures are general purpose, predominantly perennial ryegrass and white clover, with cocksfoot, Montgomery red clover, and subterranean clover. Small seeds are harvested if opportunity offers. On the second unit management is based on special purpose pastures, the ultimate aim being an all-grass farm. Up to the present rape and turnips have been grown, but there have been no cash crops or small seeds. Thus fat lamb farming is the sole source of income.

Each unit is subdivided into 8 paddocks, of which one is in lucerne. One paddock on each unit is ploughed out of grass each year. On the special purpose pastures farm the rotation is: Old pasture, rape or turnips, summer fallow, new pasture. On the other unit it is: Old pasture, rape, wheat, summer fallow, new pasture, or old pasture, turnips, barley, summer fallow, new pasture. Pastures sown on the special purpose pastures farm include lucerne/phalaris, lucerne/cocksfoot, and cocksfoot/red clover and white clover. On both units subterranean clover has been included in most of the pasture mixtures, but has seldom been prominent in the swards. Superphosphate has been applied to all pastures and crops at 1cwt. per acre per year. Liming has been 1 ton per acre initially and ½ ton per acre every second year on all pastures.

PRODUCTION SUMMARY OF FARM A (SPECIAL PURPOSE PASTURES UNIT OF 22 ACRES) AND FARM B (STANDARD PRACTICES UNIT OF 23 ACRES)

	1951-52		1952-53		1953-54	
	A	B	A	B	A	B
Ewes per acre	1.8	1.3	2.0	1.6	2.5	2.0
Total ewes	40	30	46	36	55	46
Lambs fattened (own breeding)	38	27	46	42	61	58
Average weight (lb.)	35.0	33.8	35.7	37.5	33.5	35.6
Lamb meat per acre (lb.) (own breeding)	60.4	39.7	76.7	68.5	92.7	89.8
Wool per ewe (lb.)	11.0	11.0	9.5	9.6	9.1	9.5
Wool per acre (lb.)	20.0	15.0	19.0	15.3	22.9	19.1
Store lambs fattened	30	15	22	23	23	24
Wheat per acre (bushels)	—	24	—	18	—	26
Barley per acre (bushels)	—	30	—	38	—	33

HEADING PHOTOGRAPH: Winchmore Irrigation Research Station, on which the trials described are being carried out on Lismore silt loam soil type, is typical of the light lands of Canterbury Plains. The demonstration mixed farm at Winchmore is shown here. Auster Airviews photograph.

The trial began with the sowing of pastures and crops in the 1950-51 season. For the two previous seasons the area had been used for wheat and greenfeed trials after having been ploughed out of run-out browntop pasture. Sheep were introduced in the spring of 1951 and since then each unit has carried its own fat lamb flock mated to Southdown rams. No hoggets have been reared, but each season store lambs have been purchased and fattened.

Production

A summary of production for 3 years is given in the table on page 383.

The results in the table show a steady increase in production over the three seasons. This has not been obtained without difficulties, some of which have not yet been overcome. For example, cereal yields remain low and both rape and turnip crops light. Though hay yields have been good, browntop is increasing in the lucerne stands and their life may be shorter than the expected 7 to 8 years.

Trial Results

This trial has shown that management on a special purpose pastures unit is more difficult than on a more typical farm. On the latter grazing management is relatively simple; pastures not only establish easily, but stand up well to grazing and when production from ryegrass pastures falls off grazing is available from rape, stubbles, and, occasionally, lucerne. However, it must be pointed out that the trial has not yet experienced a dry spring. On the other hand, much remains to be learnt of the management of special purpose pastures. Though these mixtures have shown ability to provide feed when ryegrass is unproductive, they do require more careful grazing management with adequate spelling. On the trial it has been found that this does not always fit in with stock requirements. As a result it is difficult to avoid overgrazing of the pastures and damage to the swards. These effects are most apparent in grazing mixtures which contain lucerne, which is easily "eaten out" of the sward.

The question of what proportion of the farm should be sown in special purpose pastures appears to be the crux of the management problem. It is felt that the optimum has not yet been found on the trial area and this is one aspect which will be investigated further as the trial continues. In addition carrying capacity and production investigations will be continued on both units, and the many small trials, most of them long term, which have been laid down on the two units to investigate aspects such as seeding rates, seed mixtures, cultivation methods, liming, and manuring will be continued.

Regrassing of Dredge Tailings in Westland County

MOST of the extensive, unsightly heaps of stones and boulders left in the wake of gold dredges in Westland are now covered with gorse, broom, toetoe, and other worthless weeds with low producing grasses such as browntop, *Poa annua*, and Yorkshire fog sparsely intermingled.

AGRICULTURALLY, such tailings are unproductive and the possibility of their revegetation with useful species of grasses and clovers is of importance to the many farming districts where they occur.

In the spring of 1948 a number of surface-sown trial plots of various mixtures of pasture species were sown down on old tailings in the Arahura Valley in Westland County (average annual rainfall approximately 100in.). Sown grasses included perennial, short-rotation, and Italian ryegrasses, cocksfoot, timothy, *Phalaris tuberosa*, browntop, chewings fescue, and Yorkshire fog. The clovers were Montgomery red, white, and *Lotus major*. A mixture of equal parts of superphosphate and basic slag at 5cwt. per acre and 1 ton of lime per acre were applied at the time of sowing. The plots have since received no further topdressings and have been unrestrictedly grazed by sheep since they were sown down.

At first there was an excellent strike of clovers. These established rapidly and grew vigorously throughout the first season. The strike of grasses was fair, except for phalaris, which failed to establish well, but their initial progress was weak and the swards consequently patchy.

In the spring of 1950 the clovers were still strong and continued to dominate the swards. Ryegrasses were showing some improvement, but in the subsequent dry season they made little headway.

By the third growing season white clover had largely replaced Montgomery red clover and was replacing *Lotus major*; perennial ryegrass and cocksfoot had become more prominent and were displacing the other grasses, including Yorkshire fog, most of which had never been strongly established.

Today the sward on the best plot is a reasonably dense and balanced one of perennial ryegrass and white clover with cocksfoot sub-dominant and some Yorkshire fog and timothy. Herbage production on this plot is considered equivalent to a carrying capacity of 3 ewes per acre.

Under the unpromising conditions prevailing on barren dredge tailings the establishment of grasses has naturally been slow, but the trial indicates that clovers will establish rapidly and vigorously and that high-producing grasses will gradually improve to give a surprisingly worthwhile cover by the third season.

Quicker and better results would have been achieved under controlled grazing and annual topdressing, but the initial heavy application of phosphates and lime appears essential to the successful establishment of useful vegetation on otherwise useless dredge tailings.

—*J. SHEPHERD,*
Fields Instructor,
Department of Agriculture,
Greymouth

Pasture consisting of ryegrass, cocksfoot, and white clover on bulldozed dredge tailings.

Much Tidying can be Done in the Home Garden in May

TO many the home garden is a discouraging place in May. Much digging and tidying usually has to be done, as the residues of half-hardy crops such as tomatoes, beans, marrow, pumpkin, and potatoes usually have to be cleared away and the land they occupy dug over. There is little to be gained in most gardens by planting or sowing any but the hardiest vegetables, as usually the weather can be expected to become progressively less favourable for growth until the shortest day. In this article A. G. Kennelly, Horticultural Instructor, Department of Agriculture, Dunedin, discusses work in the vegetable garden in May.

SOME sowing and planting usually have to be done in May, but the soil should be well drained and cultivated. If firming is necessary in preparation of the soil, it should be confined to the seed or plant rows and done only in moderation to medium and heavy soils. A simple method of testing soil condition for sowing is to walk on it. If it sticks to the soles of the boots, it is too wet. Comparatively little growth can be expected in most gardens in the next 2 months and the home gardener must decide whether anything is to be gained by sowing or planting any but the hardiest subjects such as broad beans or spinach now. It is not advisable to plant or sow even hardy subjects in cold situations where the soil is heavy and poorly drained. Temperature and other aspects of the weather are not usually so favourable that the plants should be subjected to the additional hazard of a cold, wet soil if this can be avoided.

Cabbage and endive can still be set out in most gardens and, where conditions are not likely to be too severe, lettuce and cauliflower as well. Broad beans and spinach can be sown and in some districts peas, but unless the garden is in a very favourable situation and the weather is very good, it is best to defer sowing seeds of such subjects as carrots, onions, turnips, and even radish until July or later.

The top growth of asparagus should be cut down as soon as it begins to turn yellow and digging of kumara and potato crops should be completed without delay. Potatoes and other root crops in store should be sorted over to remove those with rots. Vacant ground can be sown with a green crop or limed and attention given to the compost heap and to the burning of rubbish. Rhubarb beds should be weeded and the seed stalks removed.

If the garden is kept tidy, it can be made quite an attractive place in winter, even to those who are not gardeners. The cleaning out of untidy corners where unwanted grass and weeds are growing and the removal of such trash as old boxes, pieces of wood, old useless posts, stakes, bricks, and stones not only improve the appearance of a garden but have an important bearing on pest and disease control. Untidy corners provide ideal breeding grounds for such garden pests as earwigs, slugs, snails, slaters, cutworms, millepedes, and wireworms.

All weeds, whether among crops or around the edges of the garden, should be destroyed, as they often serve as a means by which pests such as thrips, mites, and aphides, which are often considered more serious than weeds, are carried over from season to season. They also serve as host plants for virus and fungous diseases from which insects infect the next season's crops. All weeds, long, matted grass, and untidy corners should therefore be cleared away; soft rubbish can be composted and unwanted woody material should be burnt.

Refuse of some diseased crops can safely be put on the compost heap. However, if there is any doubt about the longevity or resistance of the spores of the diseases to such destructive agencies as occur in compost heaps, the refuse should be burnt as should most garden refuse that is infested with active insect pests. The

Lupins are one of the best soil improving crops, but soil and temperature must be favourable for them to make good growth.

ash of such material is sometimes a good source of potash and should be gathered and put under cover before rain leaches the nutrients from it. It may be useful as a supplementary fertiliser for such crops as onions, tomatoes, and certain taprooted vegetables if its potash content is high.

Wood ash or the ash from garden refuse should be used with discretion, as heavy dressings may have an adverse effect on the tilth or structure of some soils. Its effect is usually most damaging on soils that contain insufficient organic matter. Moderate dressings are therefore preferred.

Cover Crops

Whenever practicable ground should be sown with a cover crop for digging in to increase the organic material in the soil. Cover crops also take up soluble plant foods and so prevent their loss by leaching. Choice of crop depends largely on the district or the period the ground is likely to be left before it is required for another vegetable crop.

Barley and oats are quick maturing and usually grow quite well even in the colder southern districts if sown now. Mustard is even quicker where conditions are warm and in favourable conditions it usually produces a heavier crop, but it usually fails to grow well where conditions are cold. Lupins make the best cover crop for digging in on most soils, as they are a legume and are a rich source of nitrogen when the nodules on their roots break down. They are subject to frost damage if sown very early for over-wintering in districts subject to heavy frosts, and if sown late in the colder districts they usually fail to make adequate growth before they are required for digging in.

The seed-bed for a cover crop should be firm and reasonably moist and for best results the seed should be gently raked in. Thick sowing is desirable with most green crops, as a thick stand of plants is required to increase the total amount of dry matter to be dug in, especially as the period between sowing and digging in is usually limited.

Money spent on fertilisers for a green crop is rarely wasted. The extra plant food applied will increase the organic matter in the green crop, but it will not be "wasted" on the green crop as is thought by some gardeners. It will be absorbed and held by it and gradually made available to the succeeding crop as the green crop rots down. The nearer to maturity a green crop is permitted to grow the greater will be the amount of organic matter available.

Broad Beans

May is usually the preferred month for sowing broad beans, as they are very hardy and do well in cool conditions. As broad beans are easy to grow and most varieties can be relied on to produce a good crop with very little attention, they deserve a place in the garden of every home where their flavour is appreciated. The earlier sowings usually mature at a time when vegetables are scarce and lacking in variety in most gardens.

They do not require special soil, but it is not advisable to sow them in wet, sticky soil or light soil that tends to dry out. They do well in fairly heavy, moist, well-drained soils that have been thoroughly cultivated and into which has been worked, if the soil lacks organic matter, a moderate amount of material such as compost or well-rotted farmyard manure.

The principal plant nutrient required on most soils is phosphoric acid, which can be supplied by superphosphate or by bone manure, though on soils such as those in many home gardens that have been cultivated for many years without a balanced manurial programme being followed, a complete fertiliser containing nitrogen, phosphorus, and potash is likely to give best results. Apart from their nutrient value phosphates are said to

have a stimulating effect on the nitrogen-fixing bacteria.

Broad beans require only a small amount of nitrogen. A mixture of 1 part of sulphate of ammonia, 4 parts of superphosphate, and 1 part of sulphate or muriate of potash, all by weight, or alternatively 3 parts of blood and bone, 2 parts of superphosphate, and 1 part of sulphate or muriate of potash worked in at 2oz. to 3oz. to the square yard, according to the fertility of the soil, will give good results on most soils that have been well dressed with balanced fertilisers for previous crops.

Though broad beans are tolerant of a fairly wide acid-alkaline range (pH), they will not thrive in excessively acid conditions, and in moderate- or heavy-rainfall districts growth in most soils not recently limed will be improved by applying carbonate of lime at about 2oz. to 4oz. to the square yard. It is best worked in some time before sowing.

Apart from weed control, beans should require little attention when young, but it is usually advisable in winter or early spring when the weather is boisterous to draw a little soil against the stems of autumn-sown plants to support them. Tall growing varieties can be stopped when they are about 30in. to 36in. high by pinching out the tops. This encourages the plants to develop sturdy growth and is often sufficient to check an attack of black aphis in its early stages, particularly if the aphides' natural enemies, such as lacewing flies, ladybirds, and their larvae, are numerous.

In many gardens where tall varieties are grown it is advisable to support the plants as they develop or as they become heavy with pods. One or more strings run along the sides of rows and tied to stakes at intervals of 5ft. or 6ft. will save the plants from being blown over.

Sowing

Beans sown early in autumn do not necessarily yield pods earlier than those sown in late autumn or early winter, for though the plants may make good growth in late autumn and early winter, they are likely, particularly where winters are fairly severe, to be damaged and checked by disease or by boisterous weather. The earliest flowers often fail to set because they are produced at a time of unfavourable soil conditions and sudden extreme temperature changes, but spring sowing should not be delayed too long, as the crop is liable to be reduced if it matures in the hot, dry conditions of summer.

In deep, well-drained soil broad beans are best set 2in. to 3in. deep, preferably with a trowel, and 4in. to 6in. apart or in the bottom of a drill about 3in. deep. Seed may be planted in double rows 10in. to 12in. apart, with each double row not less than 26in. apart. Single rows are sometimes preferred; they should be 15in. to 18in. apart. Germination is usually good, but in the home garden a few extra seeds can be sown at the ends of rows and seedlings later transplanted to fill gaps; young plants should be transplanted as early as possible. Seed varies in size, but a little less than a quart of seed will sow about 50ft. of double row. Germination can usually be speeded by soaking the seed for about 12 hours before sowing.

Broad beans grow well in cool weather, but the soil should be well drained for late autumn or winter sowing.

Copper or mercury dusts give some protection to newly sown seed against soil-borne disease, though they are not as effective as organic, non-metallic fungicidal seed dust (tetrachloro-para-benzoquinone) sold in New Zealand under two different trade names and which has been certified by the Plant Diseases Division of the Department of Scientific and Industrial Research for the treatment of pea seed for the prevention of pre-emergence damping-off or seed rot.

The dusts mentioned are poisonous and should not be inhaled. The skin should be washed as soon as possible after contact with them.

It is not commonly known that the immature pods of broad beans are delicious and may be eaten whole if they are sliced in the way usually adopted for preparing runner beans for cooking; young broad beans are quite tasty used raw in salads if they are shelled and the seeds skinned. Skinning is not difficult and with the seed coat removed the beans are sweet and tender.

Varieties

Two main varieties of broad beans are grown in New Zealand, the broad-podded or Windsor type and the long-podded type. The broad-podded type has relatively short, broad pods usually containing about 3 to 5 large seeds. It is represented by varieties such as Broad Windsor, Giant Windsor, and Harlington Windsor. Long Pod and Mammoth Pod are examples of the long-podded type, varieties of which may produce pods up to 16in. long, though usually they are about 5in. to 9in. long and contain about 4 to 7 seeds. The Windsor type is usually considered to be of superior flavour, but the long-podded beans are hardier, yield more heavily, and are usually earlier.

Dwarf varieties of broad beans are also sold by seedsmen. They are well worth growing in small gardens or in exposed situations and they are also useful for sowing in January where conditions are not too hot and dry (or even in February where the growing period is long enough) to mature before winter. The pods contain 2 to about 4 small seeds and are usually attached in fan form. The foliage is small, often fairly dark, and the internodes are very short. Examples of the type are Coles Early Dwarf and Dwarf Gem.

Diseases

Broad beans have tender, easily damaged foliage which reacts by the development of reddish spots or stains to rubbing or similar superficial injury that may be caused by insect pests or diseases. Two parasitic fungi cause superficially similar chocolate-coloured spotting or "blight" on broad beans.

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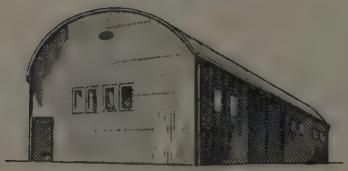

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Potatoes should be dug as soon as they are mature. The tubers are liable to damage if left in the ground in late autumn or winter.

The commonest injury is caused by the fungous disease *Botrytis cinerea*, which frequently attacks over-wintering broad beans. Where conditions favour it, botrytis may be very destructive and cause extensive spotting, blotching, or defoliation. The chocolate-coloured markings on the leaves, petioles, and stems of the plants may be superficial or may penetrate some distance and are commonly found on plants that have been subjected to severe winter weather. Botrytis is a common cause of non-setting, as infected flowers usually rot and fall. Its spread is favoured by cool, moist weather. Phosphate and potash deficiency in the soil renders plants more subject to the disease, particularly if the crop is dense, aeration is poor, and the soil is poorly drained.

A copper oxychloride spray or a Bordeaux spray at a strength of 3 : 4 : 50 is of value in combating the disease where it is likely to become widespread. Spraying is rarely necessary, as the disease is largely influenced by the weather; as conditions improve the plants usually develop new healthy growth and overcome most of the adverse effects of the disease.

The second type of spotting, commonly called bean blight, is due to the fungous disease *Ascochyta fabae*. It is characterised by the spots having greyish centres and minute pustular fruiting bodies in the central area. Control consists of the use of clean seed, the provision of good drainage, the destruction of rubbish, and the allowing of long intervals between the growing of bean crops in the same position.

Frost also may cause reddish discoloration of the stem bases.

Other diseases likely to affect broad beans are rust, sclerotinia, and wilt.

The fungous disease rust is characterised by small, dark brown, dusty, raised spots (pustules) on the leaves, leaf stalks, and stems. On the leaves the spots are often characterised by a halo of slightly lighter green than that of the remainder of the leaf. The dusty appearance of the spots is due to the production of large numbers of spores of the fungus. Infection, according to its severity, results in reduced cropping, stunting, or, rarely, the death of plants. The disease is difficult to control, but its severity can be reduced by applying at 2- or 3-weekly intervals a spray made of 4 fl. oz. of lime sulphur, 1 fl. oz. of colloidal sulphur, and 4 gallons of water.

Sclerotinia is a fungous disease characterised by the development of copious white fluffy mycelium and later of comparatively large black sclerotia or resting bodies, often inside the stems. The disease commonly attacks the main stems, usually near the base, causing them to rot and plants to wilt and die. Seriously affected plants should be removed and burnt; if they are left, the resting bodies which develop constitute a source of infection for subsequent crops. Crop rotation and good drainage, aeration, and hygiene are the most important factors in control of the disease.

Wilt (*Fusarium* sp.) may cause yellowing of the leaves and wilting and death of plants due to blockage of the conductive tissues of the lower stems and main roots. In the early stages of the disease moisture assists its development and later dry conditions hasten the death of plants. There is no practical control of the disease in the home garden, as it will live indefinitely in the soil. Rotation should be practised and peas, which are also subject to the disease, should not be sown in infested areas.

Harvesting

The harvesting of pumpkins, marrows, and squashes should be completed without delay. Even comparatively light frosts which do not appear to affect the fruits cause minute injuries to the outer skin which give entry to disease-producing spores.

Kumaras if not already dug should be lifted without delay. Potatoes are best dug, unless the climate is particularly favourable and soil drainage and cultural conditions are very good. The danger of infestation with the potato tuber moth should be guarded against by covering and bagging the potatoes as soon as they are dug. The tuber moth is a night flyer and lays its eggs singly on the under sides of potato leaves and in the eyes of exposed potatoes. Caterpillars which hatch from the eggs laid on the leaves gradually work their way down the stems; those from eggs on the potatoes penetrate the tubers and leave dirty tunnels in which fungus often develops later.

In most districts root crops such as carrots, beetroot, parsnips, and swedes are best left in the ground unless the land is required for other crops or is liable to become so wet that rots may develop or digging may become difficult. Some varieties of beetroot are susceptible to damage from severe frost, but in most districts no harm to any of these vegetables from frost or environment need be expected if the soil is well drained and not too heavy.

Parsnips and swedes benefit from moderately heavy frost. If digging is

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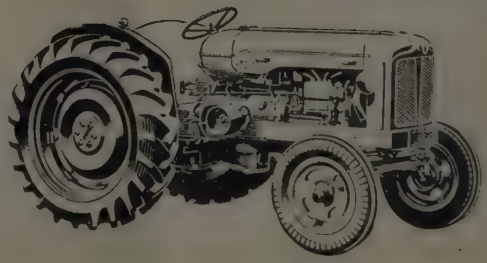

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necessary, roots can be stored in sand or clean coal ash in a shed or cellar or stacked in a box sunk in well-drained ground; swedes usually keep well even if they are not "plunged". Cool and reasonably moist conditions are necessary for the storage of practically all root crops, but care should be taken to ensure that only sound roots are put in storage.

Tubers of Jerusalem artichokes should be ready for lifting. They are not unlike knobby potatoes, but they require a different method of cooking. They have a comparatively high food value and the flavour is rather sweet. Care should be taken when artichokes are being dug to ensure that all tubers and pieces of tubers are removed, as otherwise they will start into growth, to the detriment of the succeeding crop.

Lettuce

Growth of lettuce is slow in most districts in May and the plants should be kept weed free, but the soil between the rows should not be compacted excessively by treading on it. When plants are being set out a sheltered site with a northerly aspect where the soil has been well cultivated and manured is desirable. If drainage is poor or the ground likely to be rather cold, young plants should be set out on a raised bed.

Like most salad crops lettuce should be grown quickly and at this time of the year, when in most districts conditions are not good for growth, a light, sandy loam rich in well-rotted organic matter such as farmyard manure or compost is desirable for growing plants in or setting them out into.

Lettuce plants can be set out in May for spring use, but the situation should be favourable, particularly in the colder districts.

Neapolitan Winter and Imperial 615 are good varieties for setting out in May.

Peas

Garden peas are hardy, but heavy frost is liable to affect the setting of the flowers, and frost following a mild period during which soft growth has developed may damage the haulms. In districts where winter conditions are severe autumn sowing should be early enough to enable the young plants to become established, but not so early that they make soft growth. Losses from autumn sowing may be serious in severe weather, but in well-drained soils in districts where winter conditions are not too severe it is usually satisfactory.

In many districts, however, autumn-sown crops mature little ahead of crops sown in favourable conditions in spring. For autumn and spring sowings seed should be dressed with a suitable seed protectant as advised for broad beans. The peas should be shaken for several minutes in a tin containing enough of the chemical to coat the seed. Afterward the excess chemical should be removed by tapping the tin sharply so that it falls to the bottom.

Peas can be sown in May where soil drainage is good and winter conditions are not too severe.

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A good type of broccoli or winter cauliflower, showing the strong leaves surrounding and protecting the curd.

Seed should be sown 1in. to 2in. apart in V-shaped or broad, flat drills, which can be drawn out with the hoe 18in. to 36in. apart according to variety. Drills should be 2in. to 3in. deep, except where conditions are hot and dry, when they should be considerably deeper so that though the seed should not be covered with more than 1½in. or 2in. of soil, the roots will be well down in the cooler and moister lower levels. This is very important where conditions are dry or where heavy wind is likely, as the stems can be gradually earthed as plants develop. Dwarf varieties should require no further support.

Protection of newly emerged peas against birds is essential in some districts, though birds are troublesome mainly in early spring, when food is short and lacking in variety. Pea guards made of wire netting are effective provided the ends are blocked, but they should be removed before the peas can become entangled in the wire. There are numerous other methods of protection, but their effectiveness depends on thoroughness of application and other factors. Spraying with bitter substances such as an infusion of alum or quassia in water (with soap as a spreader) or dusting the rows with sawdust, lime, sulphur, or superphosphate sometimes gives protection. Cotton stretched over the shoots is effective if a number of strands, which may be criss-crossed or stretched in parallel lines, are used.

Varieties

The most popular varieties for autumn sowing are William Massey and Greenfeast.

Spinach

Spinach is one of the few vegetables that can be sown in May, even in the colder districts, though the soil must be well drained. In favourable conditions spinach is quick growing, maturing in from about 40 to 55 days.

Spinach is hardy when established under cool conditions and can be sown throughout winter in well-drained and well-cultivated soil that is not too heavy, provided the seedlings can establish themselves without being "lifted" by frost. It will grow at temperatures only slightly above freezing, though the optimum growth temperature is somewhat higher. Though seed germinates at relatively low temperatures (40 degrees F. or even lower), seedling emergence is usually delayed where there is frequent heavy rain. Germination is good at 50 to 60 degrees F., but the percentage decreases at higher temperatures.

Spinach thrives in cool conditions on a great range of moist, fertile, well-cultivated, and well-drained soils. It is not tolerant of a high degree of soil acidity and lime should be applied to most soils that have not been recently dressed, though too much lime may cause yellowing of the leaves because of a deficiency or unbalance of certain essential elements, such as manganese or iron.

Fertilisers

A good dressing of organic material such as well-rotted farmyard manure or compost is advisable on most garden soils, and as spinach is a leafy vegetable, extra applications of nitrogen may be supplied by liquid manure or a side dressing of nitrate of soda or sulphate of ammonia raked in along the line of row, but it should not touch the foliage. Liquid manure is preferable where conditions are inclined to be dry, as abundant moisture is essential for high yields and good quality; growth should be reasonably quick, as otherwise some varieties tend to be tough.

Seed should be sown thinly ½in. to 1in. deep in rows 12in. apart. Plants can be thinned to four or five to 1ft. of row, though if seed is sown thinly, thinning in the accepted sense is not essential unless conditions are dry or the soil is very poor; it can be confined to the removal of the young plants when large enough for use. In poor soil or in dry conditions crops

Brussels sprouts should be gathered from the bottom up as they reach maximum growth.

that have been given generous spacing in the seedling stage usually "stand" much longer.

Varieties

Varieties of spinach are available with either smooth or savoyed (crumpled) leaves, but spinach is usually sold as either prickly seeded or round seeded.

Prickly seeded spinach is usually sold for winter use, as it is generally considered to be hardier than the round. Because it is considered by many to be long standing, it is also very popular for summer use. This belief in the superiority of prickly seeded spinach is not supported by the evidence of trials of different varieties of the two kinds. It has been demonstrated that there are long- and and short-standing varieties of both round and prickly seeded spinach; either may be smooth or savoy leafed.

The virus disease mosaic sometimes causes reduction in yield, and resistant varieties such as the prickly seeded Presto Blight Resistant and the shorter-standing Japanese Prickly and round-seeded varieties such as Virginia Savoy and Old Dominion have been developed overseas, though they are not yet available in New Zealand.

Spring Greens

Cabbage for spring use and the hardier varieties of cauliflower, such as All-year-round, Early London, and Walcheren, can still be set out 18in. apart in rows 24in. apart in sheltered situations or in districts where winter conditions are not too severe. The soil should be rich in rotted organic matter such as compost or farmyard manure and if drainage is poor, the plants should be set out on ridges or on a raised bed.

The grey cabbage aphis is often troublesome at this time of year and unless it is destroyed, infestation increases steadily throughout winter. It usually spreads from summer-planted winter greens such as brussels sprouts and winter cabbage to spring cabbage and young cauliflower plants, causing leaf distortion and fouling.

Grey aphides can be controlled by spraying on a warm, still day with nicotine sulphate, 1 fl. oz. to 5 gallons of water, plus a little soap to activate the nicotine or by spraying with H.E.T.P., 1 fl. oz. to 5 gallons of water.

Winter Greens

The earlier maturing varieties of winter cauliflower and broccoli should now be coming into bearing. Types best suited to districts where moderate to heavy frosts can be expected are self-protecting; that is, the leaves completely enclose the curd, shutting off light, shedding moisture, and affording protection from rain and frost. If the curd is exposed, midribs of one or more of the longer encircling leaves should be broken so that the broken end lies over the curd to give it protection. The leaf will remain alive until the curd is ready for harvesting. Brussels sprouts should be harvested regularly by the removal of the sprouts as they reach full size. The bottom sprouts should be gathered first. In exposed situations it may be necessary to stake the plants, as they usually tend to become top heavy with leaves and sprouts.

Various diseases which cause spotting or blotching of the leaves commonly develop on members of the cabbage family toward the end of May. Where only a few outer leaves are affected the trouble may be checked by their removal. Where infection is more advanced protective Bordeaux or copper oxychloride sprays may be advisable, though most of the diseases which cause forms of leaf spotting owe their increase mainly to the cool, moist conditions that commonly occur in late autumn and winter.

All photographs by Green and Hahn.

Cleaning Irrigation Races

EFFICIENT irrigation depends largely on clean races. Weedy races lose water and slow down delivery. Where the soil is suitable recutting smaller races gives temporary benefit, but efficiency is lost as soon as they become reinfested with weeds. Control by cutting and trimming is costly and often brings about undue widening and deepening of the ditches. Grassy weeds are generally the main problem and T.C.A. at 50 to 100lb. per acre race length, depending on incidence of weed growth, can safely be recommended as a method of control. If grass growth is the only problem, T.C.A. can be applied.

On steep sidelings greater care must be taken in application, as this material is very soluble and is easily carried over a shoulder with consequent denuding of grasses on the banks leading to possible erosion. The advantages of T.C.A. are that it is easily applied in solution, there is less disturbance of race structure, and the time spent on race cleaning is considerably reduced.

—*R. C. SCHOFIELD,*
Instructor in Agriculture,
Department of Agriculture,
Alexandra

Installation of Effective Mole Drainage

THOUGH mole drainage is a cheap and very effective method of draining impervious clay soil, results are often disappointing because the technique of mole draining is seldom understood. It is not uncommon to hear agricultural advisers or farmers make the sweeping statement "Mole drain it; that will fix it". "How?" is what should immediately be asked, because mole draining is not as easy as that. In this article K. L. Mayo, Instructor in Agriculture, Department of Agriculture, Invercargill, discusses the problems of mole drainage operations.

BEFORE mole draining is attempted three things should be known, namely, soil type, fall, and any timber, rock, or shingle outcrops or changes of soil type.

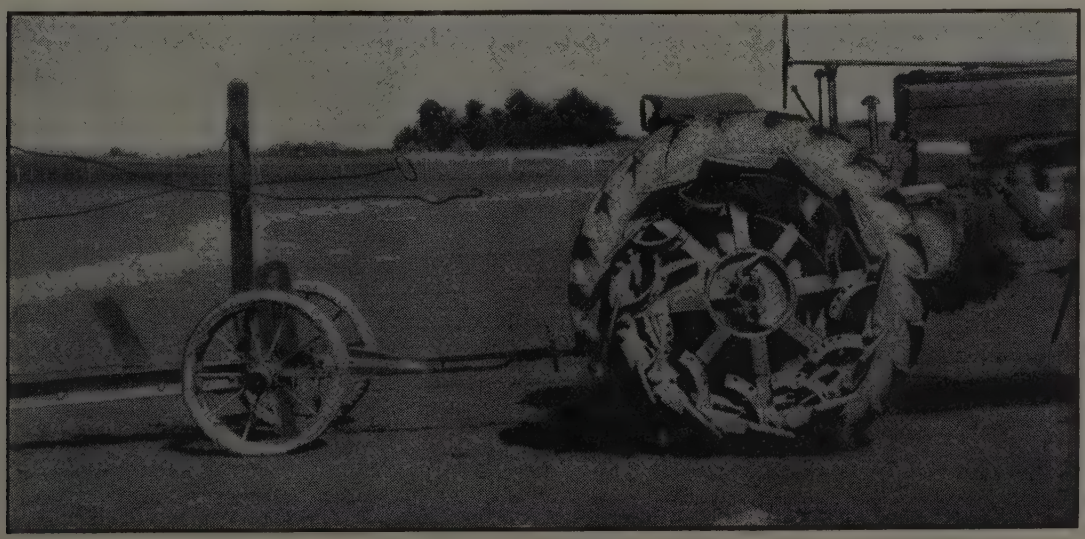
Soil Type

It is necessary to know if the subsoil of the area will hold mole drains. To determine this, samples of soil should be examined to a depth of 30in. below the surface at a number of places over the area. To hold mole drains the soil when damp should have the consistency of stiff putty. Occasionally soils will be encountered which on examination do not indicate that they will mole drain, but in practice do. Reliable local knowledge is necessary in such cases.

Fall

The effectiveness of mole drains is closely allied to fall, and because the channels tend to follow the irregularities of the ground surface, even when a plough with a long beam is used, it is necessary to secure, as accurately as is practicable, continuous or increasing fall in the mole channels. To help achieve this it is advisable to use a "dumpy" level on flat areas to determine the amount of fall so that the mole drains can be emptied into tile lines at specific distances. The installation in New Zealand of extensive

Heading illustration—Perched water-table which could be satisfactorily dealt with by mole and tile draining. Below—Mole draining under ideal conditions.



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Land before being drained in the foreground and drained land in the background.

drainage systems on farms over a wide area and observation of them during a period of 15 years have proved the following points:—

1. On falls of less than 1ft. in 100ft. mole drains are efficient only over a distance of 2 to 3 chains.

2. On falls of from 1ft. in 100ft. to 1ft. in 60ft. mole drains are efficient only over a distance of 4 to 5 chains.

3. On falls of 1ft. in 60ft. to 1ft. in 50ft. mole drains are efficient over a distance of 5 to 15 chains.

4. On falls greater than 1ft. in 50ft. it is usual to pull the drains across the slope on constant falls of 1ft. in 20ft., 1ft. in 30ft., or 1ft. in 40ft. for distances up to 25 chains. Scour gradient for mole drains is 1ft. in 10ft. of fall.

To ensure that the drains are pulled on such falls it is necessary to use an Abney level and peg in guide lines having these falls. When the face of the sideling is uniform only one guide line is required, but where the indentations along the sideling cause it to be irregular guide lines must be pegged in through the centre of each change in the indentations. When this is done the draining can be begun by pulling a mole through the centre of each guide line, and the area in between worked out by paralleling these guide lines to cover it, as with lands when a paddock is ploughed. As the work proceeds the moling is made to merge to one guide line or the other, or an intermediate stage is reached.

Some local areas lend themselves to drainage by mole drains alone, by use of major and minor drains. On these areas only $\frac{1}{3}$ acre can be drained to one major mole drain outlet. Connecting a minor drain to a major one can be done either by spearing or by digging down with a special auger on the lower side of a major drain and opening a minor drain into it. This latter method is called the McLeod method.

When the connection between the minor drains and the major drains is made with a spear the major drains are pulled first and at a greater depth to give 2in. clearance to the minor drains; that is, with a 3in. plug they are pulled at 23in. depth and the minor drains at 18in. depth. Two major drains should be pulled 4ft. apart from each outlet and the spearing done as each minor drain is pulled across them. If the McLeod method is to be used, the minor drains are pulled first and the major drains are pulled at the same depth.

Areas which lend themselves to this method of draining have good falls, and the major drains are pulled on falls of 1 in 15 or 1 in 20, and the minor drains on falls of 1 in 30 or 1 in 40. Tiles should be put in the outlets of the major drains as well as in the outlets of mole drains pulled from ditch banks.

Outcrops and Changes of Soil Type

Mole drains do not form in silt or peaty or shingle soils, and it is necessary to locate such areas before moling is begun and provide outlets for the mole drains infield of them. Shingle areas can be located with a soil spear and then pegged off, but an auger is necessary to determine changes of soil type.

Outlets and Costs

Once the preliminary inspection has been made the outlets can be planned, and the preparation of these is the most important part of the drainage operations, because without efficient outlets little benefit will be obtained—certainly not enough to repay the cost of drainage.

Very few areas lend themselves to drainage by mole drains alone, and it is necessary to install tile lines at terminals, grade changes from steeper to flatter falls, and in accordance with the available fall on flat areas.

The installation of tile drains costs today between £3 15s. and £4 per chain, and moling at 5ft. to 7ft. intervals from £1 10s. to £3 per acre. Rolling moleable country usually requires 2½ to 3 chains of tile drains per acre, which brings the cost to approximately £15 per acre. At first this may seem a large expenditure, but on analysis it is not. Cultivation, seeds, manure, and lime needed to sow out a pasture cost £10 to £12 per acre, and if this pasture runs out because of wet conditions, the money is lost and more is expended in ploughing it again and sowing to a crop which will also be affected by the wet conditions. This sequence can be repeated indefinitely, with pastures having to be resown at great cost every few years. The £15 for the installation of the drains is but a first cost, and recurring ones are £3 approximately per acre every 8 to 12 years for remoling and for maintenance of the tile drains. (Drainage maintenance is a farm operation to be regarded in the same light as fence and building maintenance.) No mention has been made of the increase in crop yields and carrying capacity and longer life of the resulting pastures. Even on flat country where extra tiles are required the costs are recouped in a few years.

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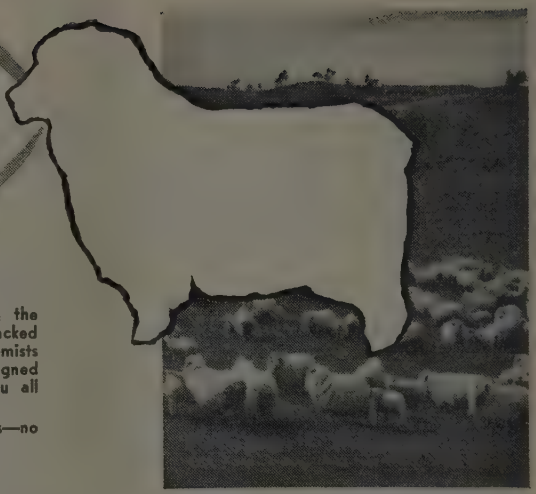

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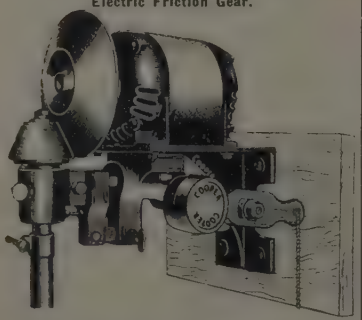

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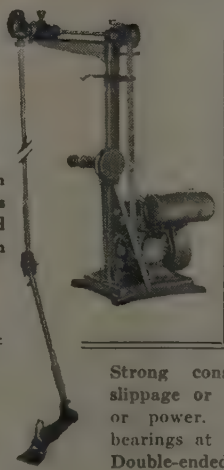

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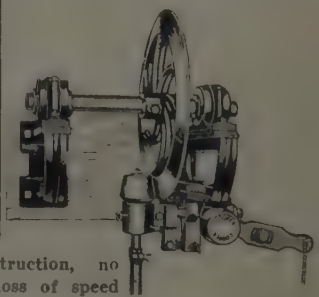

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However, the money spent on drainage can never be regained if the outlets of drains emptying into ditches or streams are immersed in water when conditions are wet. It is therefore recommended that not a penny be spent on drainage while such conditions exist. Drain outlets must always be free, as the water flows out of them by gravity, not by pressure.

Type of Mole Plough

The general construction of mole ploughs is similar. As long as any adjustment for depth, the throwing of the plough out of the ground, and letting it in are easily accomplished, and the draught is not so excessive as to require unusually powerful tractors, the three points that matter in its construction are the thickness of the blade, the size of the plug, and the method of attaching the plug to the torpedo. It is not recommended that a blade greater than ½in. in thickness be used, as tests have shown that earlier breakdown occurs with the larger blade, because its use weakens the top of the channel at the junction of the slit and the channel and causes it to fall in.

A 3in. channel will carry all the water which will collect in it when the total length of the mole channels is not greater than 25 chains. A 3in. channel is also stronger than a 4in. channel and therefore is less likely to break down. With the larger-diameter plugs there is also more chance of the channel running out of the clay into the topsoil. Plugs should not be attached to the torpedo with a nut and bolt, which will score the sides of the channel.

Power Required

For ease of operation a tracklaying tractor of the 30 to 40 h.p. class is required and is absolutely necessary on rolling country. On flat country the 30 to 40 h.p. class of wheeled tractors fitted with steel grippers have done a lot of work with 2½in. plugs.

Time of Year for Draining

The channel which a mole plough leaves in the soil only carries the water, the actual draining being done by the slit and the fractures which run out from the slit and the channel for some feet in the form of a herring bone. To obtain the best fracturing the moling should be done as late as possible in spring, before the subsoil becomes dry, and the longer the subsoil is dry after the moling is done the better.

It is useless doing the moling once the subsoil has dried out, as the channel will not form properly because the soil is too crumbly. The draught is also greatly increased. The subsoil should have the consistency of stiff putty when the moling is done, as then the torpedo and plug leave a glazed surface in the channel which hardens into a skin with drying, and this tends to lengthen the life of the drains. The time to mole drain varies with the district and season, but generally will be between August and December.

Guide lining rolling clay downs.

Depth and Distance apart

The mole plough should be set at a depth to put the channel some 6in. into the clay and usually this is obtained by pulling at 18in. depth. Some areas have deeper topsoils and it may be necessary to pull the moles as deep as 23in. Once the depth required is greater than about 25in. draining by tiles should be investigated.

Pulling at 18in. usually gives the maximum efficiency consistent with the minimum of draught needed. Because the fractures only run out for a few feet, best results are obtained from mole draining when the moles are pulled at 5ft. to 7ft. intervals. Because the mole plough follows the surface, this should be left as even as possible when a paddock is sown out, and feerings and finishes should not be in evidence. A grassed surface gives a tractor best grip, and it is preferable to have it fairly bare so that grass does not choke up under the beam of the plough and tend to raise it.

Life of Drains and Results

The length of life of mole drains and results of the draining depend on five factors:—

1. Outlets, which are the most important.
2. Length of each mole drain.
3. Available fall.
4. Soil type.
5. Weather and soil moisture conditions after drainage operations.

These are the most important factors in the length of life of the moles. If water runs out of the mole drains as they are pulled, or if there is sufficient rain to cause them to flow within a few weeks of pulling, much earlier breakdown than is usual for the type of country can normally be expected. If the water cannot flow away immediately and has to lie in the mole channels, it is particularly damaging, as it slakes the skin off the sides of the channel and causes silt to begin to fall into it, especially from the roof.

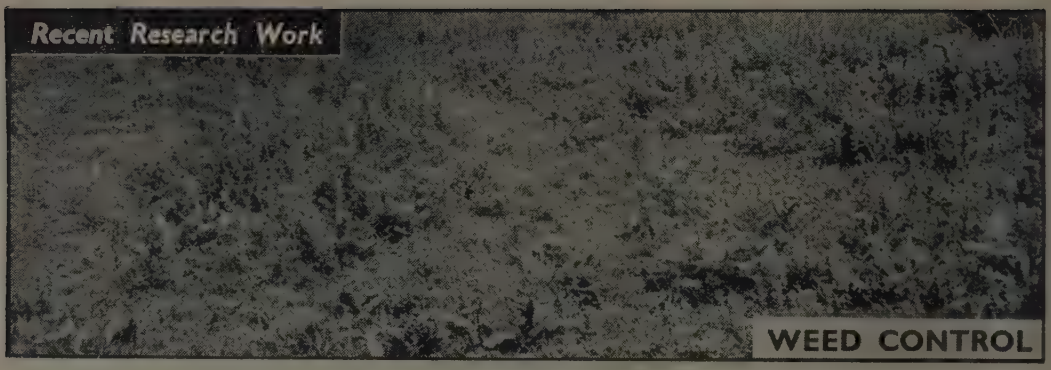
For these reasons best results are usually obtained from moling done in late spring, while the subsoil is plastic without being wet. This allows the soil to fracture and open up over summer. This does not happen to the same extent at other times of the year.

The length of life of mole drains, other things being equal, depends on the type of clay in the subsoil. The tightest of subsoils hold the majority of drains for 10 to 12 years, but some subsoils will only hold them for 4 to 6 years.

Treatment after Moling

Because of the beneficial results obtained from draining it is recommended that paddocks to be drained should be those sown out in new grass, as this will lengthen their productive life and allow them to build up fertility. When it is desired to plough a paddock for a crop, drainage in spring and ploughing the following autumn will give a better result than that from immediate ploughing, as this allows the drains to harden and the fractures to open out before the heavy implements and bulk lime sowers are taken over the area.

In conclusion it can be said that drainage is more important than topdressing or fencing and cultivating an area, because until the drainage is done very little response will be obtained from these operations. In other words, basic principles should be applied first by putting the soil in a healthy state by drainage and so providing a secure foundation on which to build.



CONTROL of weeds with weedkillers is becoming general practice in pasture and crop production and land development. These notes summarise recent trials on the control of woodsage and spurrey.

WOODSAGE

EXPERIMENTS carried out over 2½ years with hormone weedkillers in treating woodsage (*Teucrium scorodonia*), a weed that has become troublesome in the Waitotara Valley, have shown that effective control can be obtained. Woodsage has a vigorous underground rooting system which in spring sends up a dense mass of shoots which grow to about 2ft. high by midsummer and virtually take charge of the ground. As winter approaches the growth dies down and the plant becomes dormant in much the same way as Californian thistle. In general colouring woodsage is rather like horehound and is often mistaken for it.

The hormone weedkillers used in the experiment were the ethyl ester of 2,4-D, the amine salt of 2,4-D, and the butyl ester of 2,4,5-T. These were applied at 2lb., 4lb., and 6lb. acid equivalent per acre in quantities of water ranging from 100 to 180 gallons per acre. A relatively large quantity of water was required because of the dense nature of the weed and the necessity of getting a cover of spray on the lower leaves as well as on the growing point of the plant. In preliminary trials quantities of 40 and 80 gallons of water per acre had given disappointing results. The experiments were put down in spring, summer, and autumn to ascertain the best period of the year for spraying. The growth of the foliage was 4in. to 6in. high at the spring application and 18in. to 2ft. high at the summer and autumn applications. The spray was applied with a knapsack sprayer through a 32 nozzle.

Useful kills were obtained at all three periods, the spring application being best. The spring treatment had the added advantage that a relatively smaller quantity of water was required (100 gallons as compared with 180) to give a good cover of spray on the foliage; this was because of the shorter growth. The ethyl ester of 2,4-D gave a slightly better kill than the amine salt of 2,4-D and the butyl ester of 2,4,5-T, the 4lb. acid equivalent rate (95 per cent. kill) being much better than the 2lb. and basically the same as the 6lb. A repeat treatment of 2lb. acid equivalent of the ethyl ester of 2,4-D in 40 gallons of water the following spring gave complete control on the plots originally treated with 4lb. and 6lb.

The recommendation from these experiments is to spray with 4lb. acid equivalent per acre of the ethyl ester of 2,4-D in 100 gallons of water in spring when the average growth of the woodsage is 4in. to 6in. high. In the following spring 2lb. acid equivalent should be applied in 40 gallons of water. The spraying should be delayed until the average growth is 4in. to 6in. high to ensure that any late shoots are through the ground. The application of 100 gallons of water to the acre on a field scale necessitates the use of a power sprayer; water supply presents no great difficulty, because the weed is predominantly on alluvial country adjacent to the river. It is desirable to drive the spray on to the foliage from the side rather than from directly above, because spraying from immediately overhead tends to wet only the top two or three leaves of the plant.

—A. A. DUNCAN

HEADING PHOTOGRAPH: River flat paddock in Waitotara Valley infested with woodsage, buttercups, and docks.

* * * *

SPURREY IN RAPE

TRIALS on the pre-emergence control of spurrey (*Spergula arvensis*) in rape with T.C.A. (sodium salt of trichloroacetic acid) and I.P.C. (isoprophyl-N-phenyl carbamate) were conducted on farms near Gore during the past season. The treatments were T.C.A. at 5lb., 10lb., and 20lb. per acre and I.P.C. at 1lb., 2lb., and 4lb. acid equivalent per acre. These treatments were replicated. Two pounds of club root resistant rape seed was ridged with 4cwt. of turnip manure per acre on a paddock which lay away from the sun, was inclined to be wet, and was heavily infested with spurrey seed. The weather was dry at the time of sowing, but there was sufficient soil moisture for good germination and establishment of the sown crop. The crop was sown on 16 December 1952, and the trial laid down the following day.

Both T.C.A. and I.P.C. were applied, with a knapsack spray, with water at 80 gallons per acre. The rape germinated well in less than a week and apparently suffered no ill effects from the weedicides. Owing to the continuance of dry conditions, spurrey did not appear for some days after the rape, but when rain came there was rapid growth.

The plots treated with T.C.A. and the control plots became heavily infested with the weed. I.P.C., however, was more effective. The 2lb. application noticeably suppressed spurrey; the 4lb. application gave complete control and there was no spurrey growth on this treatment throughout the duration of the trial. In particular, there there was no visible effect on rape and growths compared with that of control plots appeared normal. Lambs showed neither preference nor distaste for the treated plots.

—T. L. REID

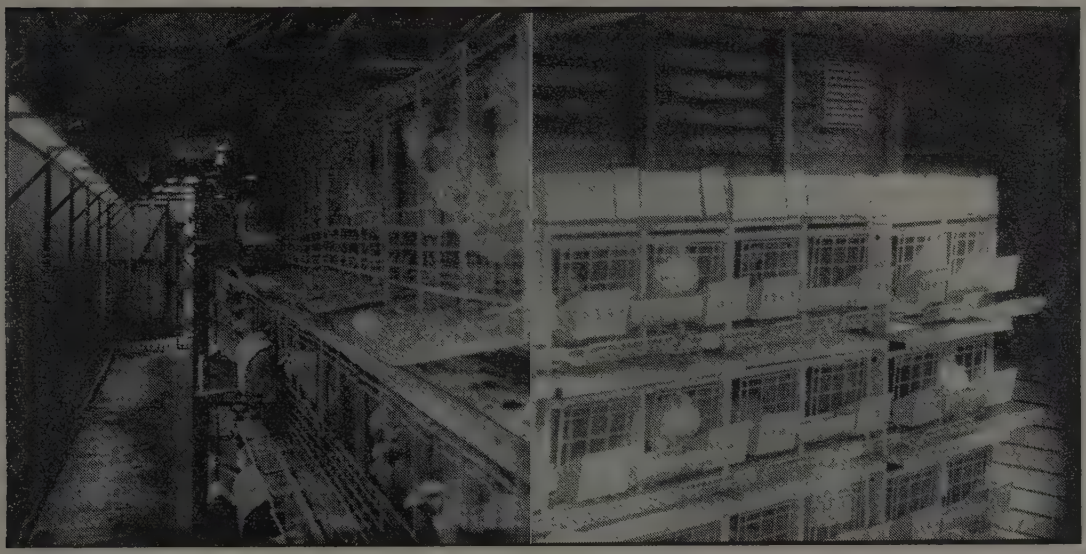
* * * *

LUCERNE

T.C.A. formed the main treatment for recent weed control trials on lucerne. In a few trials forms of I.P.C. were also included. All treatments were applied when the lucerne was dormant. The T.C.A. applications gave good control of both annual and rhizomatous grasses, but reduced the yield of lucerne in the first cut after treatment. The I.P.C. treatment did not retard lucerne growth, but effective grass control was not always obtained. These trials show that grasses can be kept out of newly sown stands of lucerne, but that yield reduction of the lucerne occurs up to the first cut when old weedy stands are renovated by the use of T.C.A.

—L. J. MATTHEWS

Commercial Egg Production in Britain



Laying battery cages for poultry. Above left—The cafeteria system of cage feeding. Note the opening between the wall and the eave of the roof. A development of this type of house would be suitable for use in most parts of New Zealand. Above right—Cages with fixed feeding equipment. Below—Less elaborate battery house.

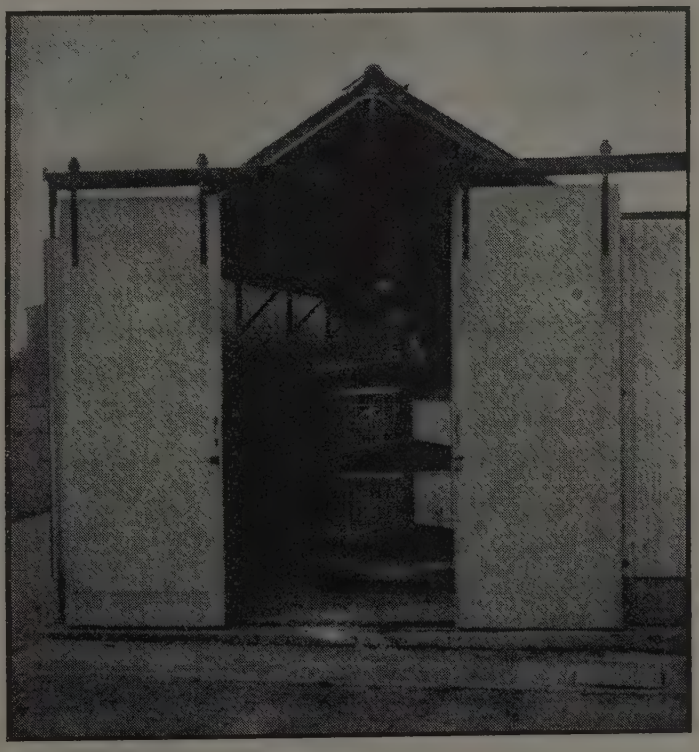
IN the first article of this series on poultry husbandry in Britain in the February issue of the "Journal" F. C. Bobby, Superintendent, Poultry Industry, Department of Agriculture, Wellington, described the poultry industry organisation and referred to poultry breeding practices in Britain. This article describes the practical aspects of table egg production and refers to the changes in management methods which have taken place in the last 10 years.

TWO features of commercial egg production in Britain at present as compared with, say, 10 years ago are the greatly increased use of crossbred pullets and the marked swing toward management under intensive conditions as opposed to the use of the semi-intensive and free range systems.

Crossbred Pullets

The introduction of sex-linked crosses in poultry was a breeding development which gave the first real impetus to the use of crossbred birds for egg production. In particular the Rhode Island Red cross Light Sussex proved most popular before the Second World War, as the brown pullet proved to be a good laying bird when satisfactory parent stock was used, and the white cockerel could be turned into a profitable table bird. In addition the sex-linked inheritance for colour permitted the separation of the sexes at a day old.

With the establishment of chick sexing by the Japanese manual method as a routine practice for separating the sexes of chicks at a day old the importance of sex-linked inheritance for colour was appreciably lessened.



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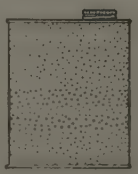

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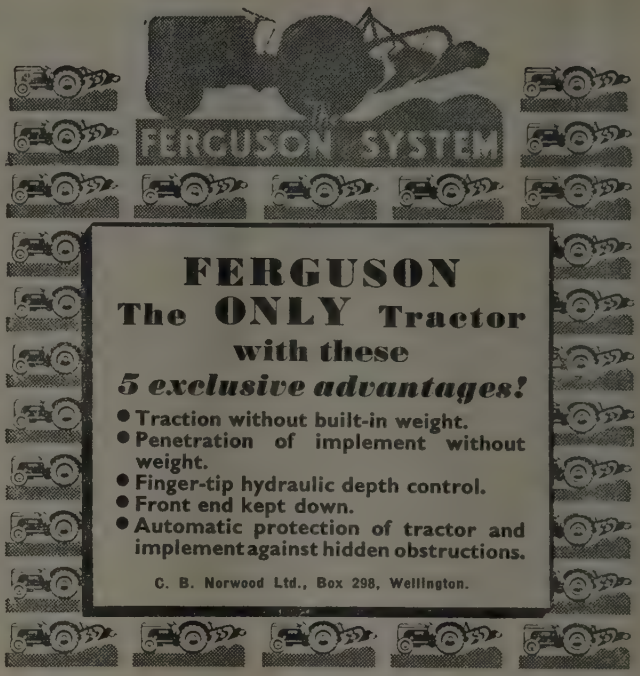

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Straw yard or hen yard system of running laying pullets, where each bird is allowed 6 sq. ft. of total floor space, usually made up of about 2 sq. ft. in the house and 4 sq. ft. in the yard.

Nevertheless crossbred pullets for egg production had come to stay.

During and since the war increased attention has been paid to the so-called hybrid vigour or heterosis which is developed when two separate breeds are crossed.

Experimental work and practice indicate that hybrid vigour tends to increase viability, particularly during the rearing stages, and also egg production. Further attention has been given to selecting inbred strains of purebred stock for ultimate crossbreeding with in many instances significant increases in egg production as compared with the production of the parent stock.

An endeavour is now being made to develop crossbred pullets of a comparatively low body-weight but with high egg production. Such birds give production comparable to other laying stock, but require less food, maintenance requirements being lower than for those birds with greater weight or body size.

The commercial egg producer in Britain sees an economic advantage in running crossbred pullets, which tend to rear more easily, give a reduced over-all wastage as adults, and lay more eggs than the average purebred birds available.

These crossbred pullets appear to be standing up to modern mass production methods better than average present-day purebred birds. Fortunately it is being recognised that it is essential to maintain high-quality purebred stock from which to breed the crossbred layers. Consequently, as was stated in the first article of this series, there has been no relaxation by specialist pedigree poultry breeders in their endeavours to raise the production and viability standards of the pure breeds. Though crossbred birds may be used extensively for straight table egg production, there is and always will be a place for the pedigree breeder of purebred stock.

Intensive Systems for Egg Production

Before the Second World War most table eggs were produced by birds which were run under the semi-intensive, fold unit or free range systems. It is here that a limited number of battery cage or laying cage units had been established; sufficient in fact to indicate the value of this system for commercial egg production.

Then came the war and food supply difficulties made the feeding in battery cages somewhat of a problem. Since the end of the war there has been a marked change-over from the systems named to battery cages, deep-litter houses, and straw yards, all intensive systems of management. It is interesting to review why this change has taken place.

In the past in Britain as in New Zealand egg prices have fluctuated with the season of the year and the egg supply position. Prices have been low during spring and early summer during the egg flush period and high in winter when eggs are in short supply. Poultry farmers have always endeavoured to get winter egg production to catch the higher price at that time. In the past the main management aids to this end have been hatching future layers at the right time and the use of artificial lighting (electric lighting) during winter.

The introduction of laying batteries quickly demonstrated that increased winter egg production can be obtained with this system as compared with the semi-intensive system, even when

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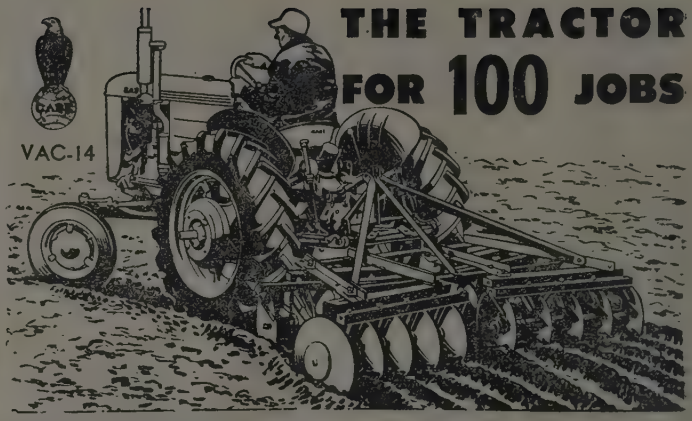

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Typical type of fold unit. This system has lost much of its popularity in recent years, mainly because artificial lighting in winter is not a practical proposition with it.

artificial lighting in winter is used with the latter system. During the war and post-war years the deep litter system was developed and as experience has grown with this new system it has become evident that it is another method by which increased winter egg production can be obtained. At the same time experience was gained with the straw yard system, which has proved to be a better proposition for winter egg production; more particularly for the general farmer who in the past has kept birds on free range or in fold units.

Thus the commercial egg farmer in Britain is turning more and more toward intensive systems for running pullet flocks because of the chances of increased winter egg production and the consequent greater monetary returns in winter.

Comparison of Intensive Systems

If it is accepted that the intensive systems give increased winter egg production as compared with the semi-intensive fold unit and free range system, the question arises as to which of the intensive systems give the best money return for eggs produced. Evidence collected to Britain from experiments and practical demonstrations indicates that the highest production, particularly in winter, can be obtained with laying batteries including the use of artificial lighting during the winter months.

The laying battery system involves a considerable capital outlay on metal cages plus a satisfactory laying battery house. Figures quoted in July of last year were 20s. to 30s. per single bird cage and a further 20s. per bird for the battery house. It was stated that on average it cost 45s. per bird as a capital charge for the laying battery system. The cost per cage varies according to whether the battery is fully mechanised; that is, has the cafeteria or static type of feeding. Costs are reduced when two birds are placed in each cage, the latter then costing 20s. per cage. For reasons which were not evident there does not appear to be a majority of two-bird cage batteries in spite of the obvious saving.

Considerable interest in the laying battery system is being shown in New Zealand at present. A limited number of laying battery units have been established; in some cases with equipment from Britain. It is reasonable to believe that this system has a future in New Zealand and will gradually increase in popularity in spite of the heavy capital cost. Imported cages are about double the price of those quoted for Britain.

Experience of this system under New Zealand climatic conditions will be necessary, but it is highly probable that for many areas the type of battery house used could be much simpler in construction and therefore cheaper than those used overseas where severe winter conditions are experienced.

Bulletins for the Commercial Poultry Keeper

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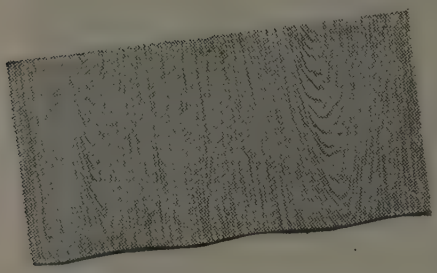

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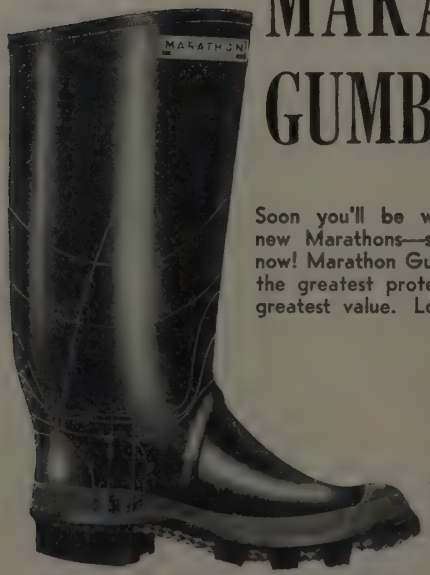

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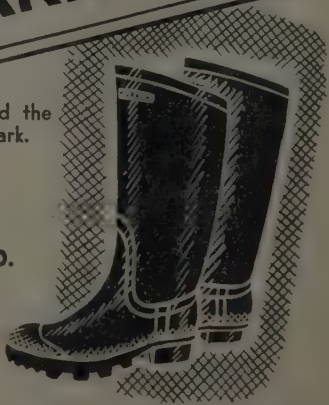

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Farm Storage of the Potato Crop

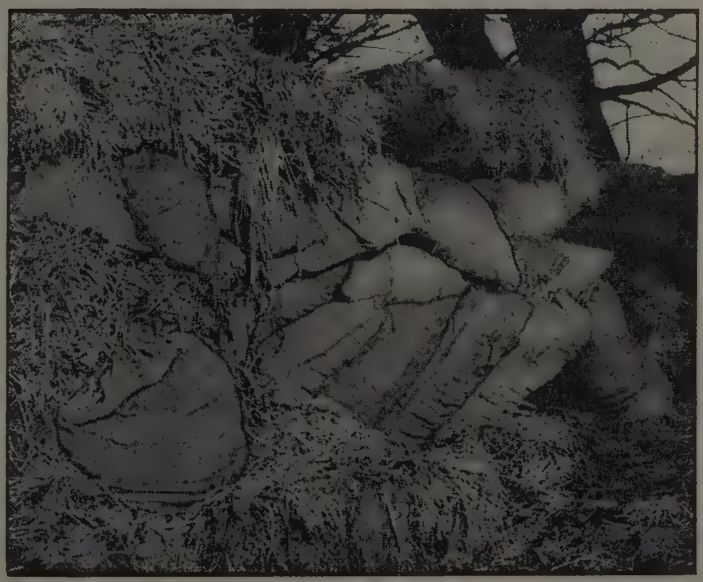
AS an over-supply of potatoes in city stores is an ever-present possibility, farm storage facilities for this perishable crop should receive more attention. In this article some of the methods of storage are described by H. A. Duff, Fields Instructor, Department of Agriculture, Dunedin.

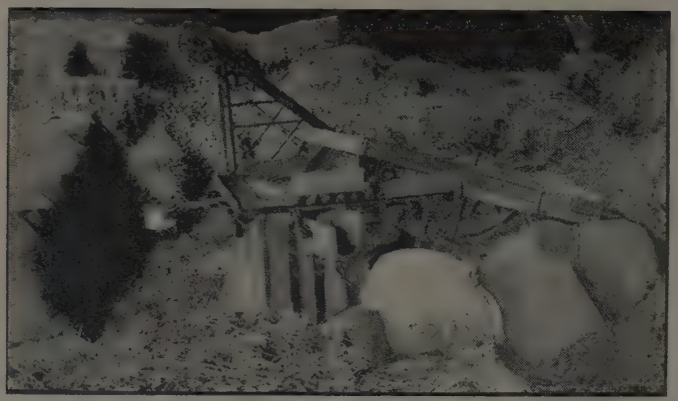
FOR some years a shortage of potatoes in New Zealand readily assisted the grower to dispose of his crop, with the result that in many instances the necessity to give consideration to storage facilities was overlooked. As it is not possible to forecast production accurately from season to season, it is always advisable to provide for adequate storage on the farm. Serious losses can occur if suitable or adequate storage facilities are not available.

Storage in Pits

Pitting is perhaps the most common method of storage for large quantities of tubers, but it has some disadvantages in districts where the weather is uncertain. Tubers can be stored either loose or in sacks. Handling for grading at a later date can be simplified if they are stored in sacks. Where a well-drained and sheltered site is available baled hay or straw can be

Pits opened up to show potatoes stored loosely (above) and in bags (below).





A grading and bagging machine ready for work at the pit.

used for the sides and ends of the pit. The top can also be covered with bales, but care is needed in the placing of them if moisture is to be prevented from entering the pit. Loose hay or straw, if used, should be covered with soil, some of which will be obtained from the drainage ditch around the site. The tubers will not keep satisfactorily if excess moisture is allowed to enter the pit. On the other hand provision for ventilation is also important. Pits covered with straw and then soil are likely to be insufficiently ventilated, particularly when the potatoes are stored loose. This can be overcome by leaving a very narrow band at the apex of the pit uncovered by soil. This will provide adequate ventilation and if the apex is well covered with straw and the part uncovered by soil is kept narrow, not sufficient rain will enter to injure the potatoes. The number and size of pits will usually have to be determined after digging begins. If tubers are to be stored in the standard grain sacks (23in. x 46in.) approximately 90 to 100 cub. ft. of storage space will be required per ton of potatoes, 14 bags being allowed to the ton. Slightly less space will be required if tubers are stored unbagged in the pit.

To bind the corners of the pile alternate rows of bales of hay or straw should be arranged as in the diagram. Pits should not be more than four or five bales high.

When bales of hay or straw are used the corners of the stack should be bound by the same methods as the bricklayer employs (see diagram at left).

Storage in Buildings

In districts where frosts are not severe the use of a well-ventilated farm building is favoured by many growers and undoubtedly has much to recommend it. Such a method allows for the grading of the tubers irrespective of weather.

A woolshed provides ideal storage, and a hay barn not required for storage of hay is also suitable for potatoes. On some farms a disused stable might be available, but a loose-box or similar building is too enclosed. In these types of storage potatoes for eating must be well covered to prevent greening unless the building itself can be sufficiently darkened.

Though adequate and suitable storage space may be provided, serious losses can occur if the crop is inefficiently handled at the time of digging or grading. All digger-damaged, diseased, green, and frosted tubers should be discarded before being stored. Rough handling of the filled bags should be avoided as much as possible.

Attention to the points outlined will save the grower much labour and wastage in the marketing of his crop.

Radio Broadcasts to Farmers

THE following radio broadcasts to farmers will be given during May:—

1XH Hamilton

9 May (12.33 p.m.)—"The Wintering of Sows", by O. V. Griffiths, Veterinarian, Department of Agriculture, Hamilton.

16 May (12.33 p.m.)—"Soil Testing Overseas", by E. B. Davies, Department of Agriculture Soil Research Station, Rukuhia.

23 May (12.33 p.m.)—"Trends in the Pig Industry", by D. J. Carter, Federated Farmers, Hamilton.

27 May (8.10 p.m.)—"Current Farming Problems", by panel of speakers.

30 May (12.33 p.m.)—"The Use of Green Crops in the Home Vegetable Garden", by W. Brandenburg, Horticultural Instructor, Department of Agriculture, Hamilton.

1YZ Rotorua, 7.15 p.m.

12 May—Young Farmers' Club talk, arranged by Eastern Bay of Plenty district committee of the New Zealand Federation of Young Farmers' Clubs.

25 May—"Wintering the Sow and Litter", by H. H. Preston, Supervisor, Bay of Plenty District Pig Council.

26 May—"Feeding and Rearing of Calves", by O. V. Griffiths, Veterinarian, Department of Agriculture, Hamilton.

4YA Dunedin, 9.15 p.m.

2 May—"Rabbit Destruction", by J. P. Shennan, Assistant to Livestock Superintendent, Department of Agriculture, Dunedin.

9 May—"Winter Requirements of Bees", by L. J. S. Line, Apiary Instructor, Department of Agriculture, Invercargill.

16 May—"Meat Quality", by I. M. Cairney, Veterinarian, Department of Agriculture, Dunedin.

23 May—"Poultry Feeding", by J. Edmondson, Poultry Instructor, Department of Agriculture, Oamaru, and a poultry keeper.

30 May—"Trials in Winter Feeding of Hoggets", by K. H. C. Lewis, Research Officer, Department of Agriculture Invermay Research Station, and I. M. Cairney, Veterinarian, Department of Agriculture, Dunedin.

4YZ Invercargill, 7 p.m.

3, 10, and 17 May—"Land Development", by W. Faithful, Instructor in Agriculture, Department of Agriculture, Invercargill.

24 and 31 May—Talk by G. Gray, Livestock Instructor, Department of Agriculture, Invercargill.

Regular Sessions

1XH Hamilton, Mondays at 12.33 p.m. and Tuesdays at 8 p.m. (Frankton stock market report), Wednesdays at 12.33 p.m. (report from Ruakura Animal Research Station), Thursdays at 12.33 p.m., Fridays at 8 p.m. (stock sale review).

1XN Whangarei, Mondays at 8.5 p.m., Wednesdays at 8.1 p.m. (Northland stock market report), Fridays at 8.1 p.m.

1YA Auckland, Mondays, Tuesdays, Wednesdays, Thursdays, Fridays, 7.45 p.m., and Saturdays at 6 p.m.

1YZ Rotorua, Mondays at 12.33 p.m. (Waikato stock market review), Tuesdays at 7 p.m. (Hamilton stock market report), Wednesdays at 7.15 p.m. (Pig Council talk on fourth Wednesday of every other month), Thursdays at 12.33 p.m. and 7.15 p.m. (fortnightly).

2XA Wanganui, Wednesdays at 8 p.m. (Wanganui stock sale report), Thursdays at 8 p.m.

2XG Gisborne, Tuesdays at 8 p.m., Fridays at 8.2 p.m. (Gisborne stock market report).

2XN Nelson, Thursdays at 8 p.m.

2XP New Plymouth, Thursdays at 8.1 p.m.

2YA Wellington, Mondays at 7.15 p.m. Thursdays at 12.33 p.m., Fridays at 7 p.m.

2YZ Napier, Tuesdays at 12.12 p.m. (Hawkes Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 p.m. (Hawkes Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

2ZA Palmerston North, Mondays at 12.33 p.m., Fridays at 8.45 p.m. (Feilding stock market report).

3XC Timaru, Mondays at 8 p.m. (Pleasant Point stock market report), Tuesdays (fortnightly) at 8 p.m. (Temuka stock market report), Wednesdays at 8 p.m., and Saturdays at 10.30 a.m.

3YA Christchurch, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m. and 7.15 p.m.

3YZ Greymouth, Thursdays at 12.33 p.m.

4YA Dunedin, Mondays at 12.33 p.m., Wednesdays at 7 p.m. (Burnside stock market report), Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.33 p.m., Tuesdays at 7 p.m.

Trees on the Farm

Planning a Woodlot

IN those parts of New Zealand where the land is generally regarded as "too good for forestry" it is likely that the shelter motive will predominate in any tree plantings made on farms. However, even on such farms there are usually places which could be more economically planted in trees than farmed in any other way. On marginal lands the allocation of areas to the growing of trees is frequently on a more generous scale, particularly when it is realised that land marginal for agricultural or pastoral purposes may be good tree growing land. However, it must be emphasised that any poor land is not necessarily "good enough for trees"; a much safer generality is that "land which has once borne trees will do so again". This article on planning a woodlot is the second in a series on trees on the farm by W. H. Jolliffe, Officer-in-charge, Extension Forestry, New Zealand Forest Service. The first article appeared in last month's "Journal".

SOME of the many matters requiring consideration in preparation for the establishment of a woodlot are:—

The extent and location of the area which can or should be devoted to the growing of trees.

The purpose of the planting: Whether for timber, fencing materials, or firewood; to prevent or combat erosion; for shelter or beautification, or a combination of one or more of these purposes.

Site factors such as altitude, topography, aspect, soil, climate, and the vegetative cover already present.

The source of tree stocks; whether by purchase or by home growing.

Whether or not proper silvicultural treatment can be given to the stand once it is planted.

On fairly intensively farmed land the area allotted to tree growing will generally be small and will include steepish sidelings and perhaps awkwardly placed areas of gorse, broom, and bracken; the area will frequently be on outcrops of poorer soil and will include portions of irregular shape, such as the corners where three or four paddocks meet.

Often the intending planter will purchase his young trees from a nurseryman and though radiata pine and one or two more staple lines may be obtainable at short notice, other species frequently will not. Commercial nurserymen will grow what the customer requires provided they know beforehand what his requirements are. Therefore stock should be ordered well in advance, particularly if the species is one that is not commonly grown. Information on propagation of trees in a farm nursery will be given in a later article.

The choice of species will be governed by the purpose of the woodlot and by the site, and the species chosen and the likelihood of future treatment will determine planting distances. At the same time consideration must be given to certain legal requirements in relation to tree planting.

During a storm these trees could cause damage to power and telephone lines.

Restrictions on Planting

Tree planting in New Zealand is comparatively free of controls, but there are certain statutory restrictions.

Noxious Weeds Act 1950: This Act provides that certain trees may be declared noxious weeds in any specified locality. The First Schedule includes the following tree species: Crack, grey, and pussy willows, silver poplar, hakeas, and hawthorn. Before planning to plant any of these trees a farmer should find out from his local county council or Livestock Instructor if they have been declared noxious in his locality.

Boundaries—Fencing Act 1908: Trees or hedges may not be planted or sown along any boundary line until the written consent of the owner or occupier of the adjoining land has been obtained, whether the area is privately owned, Crown land, public reserve, or a railway track.

Roads—Public Works Act 1928: Trees or hedges which are detrimental to the maintenance of any road or street or endanger any traffic or are likely to do so during storms can be totally or partly removed if the owner does not do so when requested by the local authority. Before trees are planted near a road the ultimate size and shape of the proposed species should be considered.

Power and telephone lines—Public Works Act 1928 and Post and Telegraph Act 1928: Trees or portions of them endangering or likely to endanger electric lines can be removed if the owner has not already done so when requested by the appropriate authority. Before trees are planted near a power or a telephone line the ultimate height and spread of the species should be considered.

Aerodromes—Public Works Amendment Act 1935: The allowable height of any object in the vicinity of an aerodrome is calculated by reference to gradients (between 1 in 20 and 1 in 50) from the outer limits of runways. Before trees are planted near an aerodrome advice should be sought from either the Civil Aviation Administration or the Ministry of Works regarding the permissible height in that locality.

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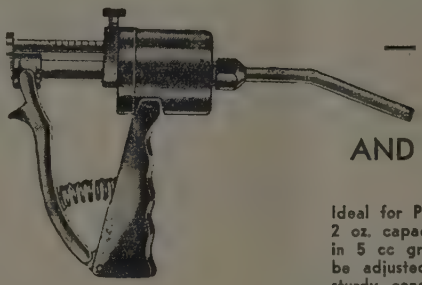

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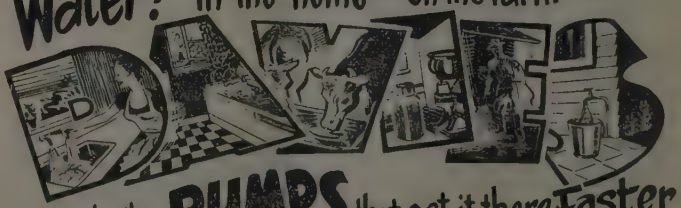

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Maintenance of Hive Equipment

Seasonal Notes for the Domestic Beekeeper

DURING spring, summer, and autumn beekeepers busy with colony development, harvesting of honey, and preparation for wintering may lack time to provide the care and attention necessary to maintain equipment in first-class order. At present high costs hive equipment represents a far greater outlay than the bees, and time spent on maintaining it in good condition is well spent. In this article D. Roberts, Apiary Instructor, Department of Agriculture, Auckland, discusses ways of keeping hive equipment in sound order indefinitely.

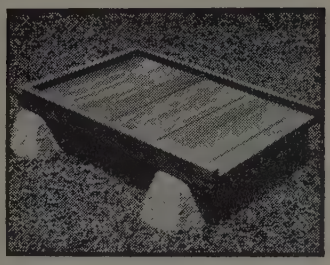
CARE and maintenance of hive equipment tend to be overlooked by beekeepers during periods when outdoor activities are greatest. In most parts of New Zealand the bees of a hive can be replaced much more cheaply than the equipment needed to house them. Proper care and protection of hive bodies, floors, and roofs pay handsome dividends to the beekeeper, particularly in these days when all such equipment is mainly manufactured from exotic softwoods.

New Zealand climatic conditions of comparatively high average rainfall and correspondingly high relative humidity tend to cause rapid deterioration of exposed softwoods unless they are protected by the application of wood preservatives or a good paint. All exposed hive material in contact with or near the ground should be treated with a good wood preservative followed by a coat of priming paint and a second coat of a good finishing paint. The preservative and paints are most effective if applied when the material is being made up, as they can then be applied to all joints and overlapping surfaces. The repair and painting of equipment can best be done in the winter evenings or weekends.

To enable equipment in use to be repaired at convenient times it is advantageous to have a supply of spare supers, roofs, and floors on hand so that if during hive manipulations a part is found to need repair or painting, it can be replaced immediately and put aside for attention later. In this way the hives can be continuously maintained in a sound, watertight condition and the necessity for disturbing the colony at unsuitable times is avoided.

Preserving Supers

All supers should be renailed if they are not firm. Galvanised nails 2½in. to 3in. are best for this work, as they hold better than plain wire nails and do not rust. Cracks should be filled with putty or plastic wood before repainting and any holes plugged or covered.



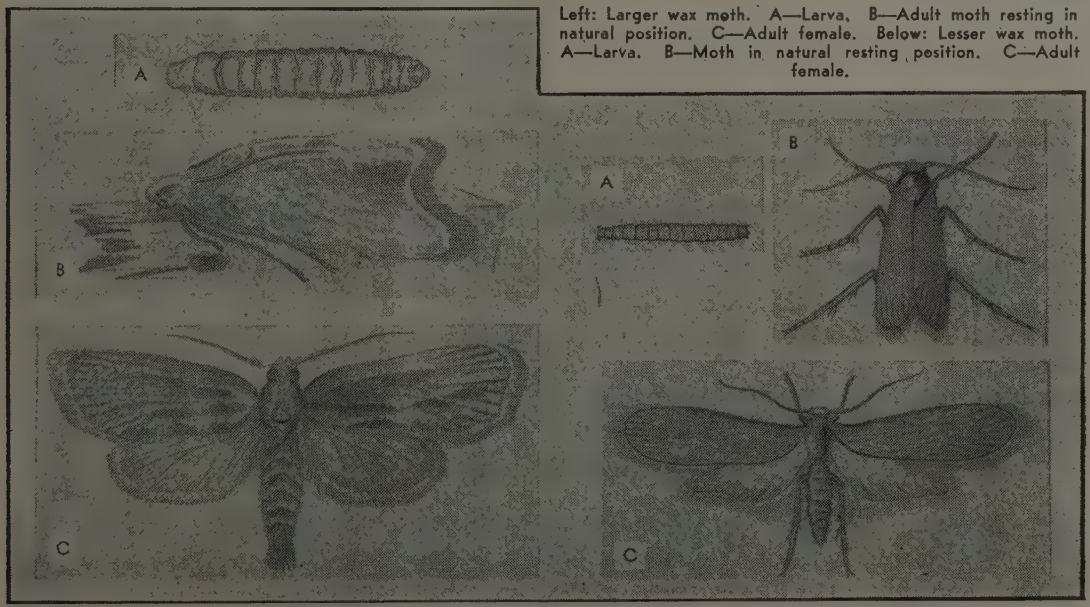
A bottom board treated with preservative and resting on a concrete hive stand.

Wood preservatives containing creosote or other coal tar derivatives should not be used. These substances in certain circumstances will possibly cause an undesirable taint in the honey produced in hives treated with them.

Where it is necessary to use a wood preservative on honey supers a copper naphthanate solution is preferable. In most circumstances proper painting of honey supers with a good primer followed by one or two coats of good-quality paint will provide ample protection.

Brood Chambers and Bottom Boards

Brood chambers and bottom boards deteriorate much faster than other hive parts, especially when set on the ground. Bottom boards even when



Left: Larger wax moth. A—Larva. B—Adult moth resting in natural position. C—Adult female. Below: Lesser wax moth. A—Larva. B—Moth in natural resting position. C—Adult female.

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raised on stands are subject to moisture and insect damage. Their life can be greatly extended if, when they are made up, they are thoroughly soaked in a wood preservative and then given one or two coats of a good bituminous base paint before use.

Brood chambers should be given a dressing of wood preservative before painting. Hive lids and covers should be checked for leaks and these repaired when found. Metal covers and any exposed woodwork should be well painted to prevent rust and rot. If tarred roofing material is used for covering lids, it should be closely examined for cracking. If cracking is only slight, a heavy dressing with a good bituminous paint will often give extended life, but if cracking is extensive, the material will be almost impossible to make leakproof and it should be replaced.

When lids are being covered with tarred roofing material care should be taken to see that it is warmed sufficiently to be pliable before application. Exposing the material in a warm, sunny spot or placing it in a hot-water cupboard for a day or so is generally sufficient to soften it to a point where it can be attached to the lid without cracking. Care in this regard is most important if a reasonable life is to be expected of the cover. Even if cracking is not apparent when the material is first put in place, cracks will soon develop if the material is cold and stiff when applied.

Care of Stored Combs

Most beekeepers, particularly those working for extracted honey, will find that they have a surplus of empty combs to store through the winter. These empty combs are the most valuable part of a beekeeper's hive equipment, and if they are to be maintained in good order from season to season, strict precautions against possible damage by mice and wax moth must be taken.

Wax moths of which there are two species in New Zealand, the larger wax moth (*Galleria mellonella*) and the lesser wax moth (*Achroia grisella*), are responsible for much of the loss of stored combs. Combs allowed to become infested with the larvae of these moths will be reduced to a useless heap of discoloured residue.

Wax moth on combs in storage can best be controlled by the use of fumigants which will kill the moths and larvae or will repel the adult moths so that eggs are not laid on or near the stored combs. Fumigants such as calcium cyanide and carbon disulphide meet all requirements, but they are **extremely poisonous to humans** and should not be used for wax moth control except by those fully experienced in their use and who have the necessary facilities of airtight rooms and respirators.

In addition to being poisonous carbon disulphide is also highly inflammable and the vapour it gives off is explosive when mixed with air.

Bee combs completely destroyed by wax moth.

For general use in the small home apiary para-dichlorobenzene (or more commonly P.D.B.) is quite effective for destroying adult moths and larvae. It will not destroy the eggs and therefore stored combs treated with it should be inspected every 3 to 4 weeks when moths are active and the fumigant renewed where necessary.

Para-dichlorobenzene is a white crystalline substance which changes slowly into a heavier-than-air gas. The gas is not unpleasant to smell and is not injurious to humans at the concentrations obtained when it is used as directed. To obtain the best results with this fumigant the combs to be stored should be placed in good, sound supers free from holes or cracks and the supers stacked as tightly as possible, the cracks between being covered with gummed paper strips.

Method of Using P.D.B.

Because the gas given off by para-dichlorobenzene is heavier than air, the crystals should be placed on the top of the frames of the top super. Two to 3 tablespoons of the crystals placed on a piece of cardboard or paper to prevent contact with the combs will be sufficient for up to 6 supers of combs. The lid should fit closely and the bottom super should rest on several layers of newspaper or sacking so that the gas cannot escape easily. If the supers are stacked where mice are prevalent, queen excluders placed at the top and bottom of the stack will prevent mice from gaining entry at these points. Since the gas given off by para-dichlorobenzene is non-poisonous, the combs can be stored and treated in any available storage space without risk of fire or harm to the beekeeper.

The crystals volatise much more rapidly and are much more effective at temperatures of 70 degrees F. and over than at lower temperatures. Stored combs should be inspected at intervals of not more than 2 to 3 weeks and where the crystals have evaporated fresh supplies of the fumigant should be placed in position.

Careless handling or excessive use of this chemical in the treatment of bee combs for control of wax moth may cause serious contamination of honey subsequently stored in them. The combs should be thoroughly dry and free of all traces of honey when stored under fumigation. They should not be returned to the bees until they have been thoroughly aired by being stood outside in the open for at least 3 days.

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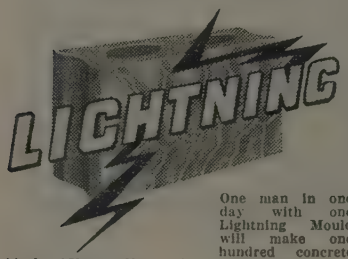

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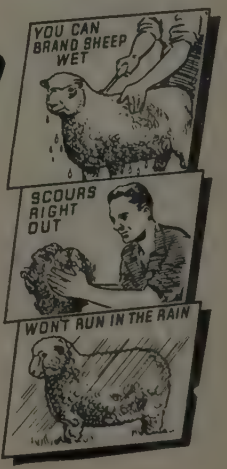

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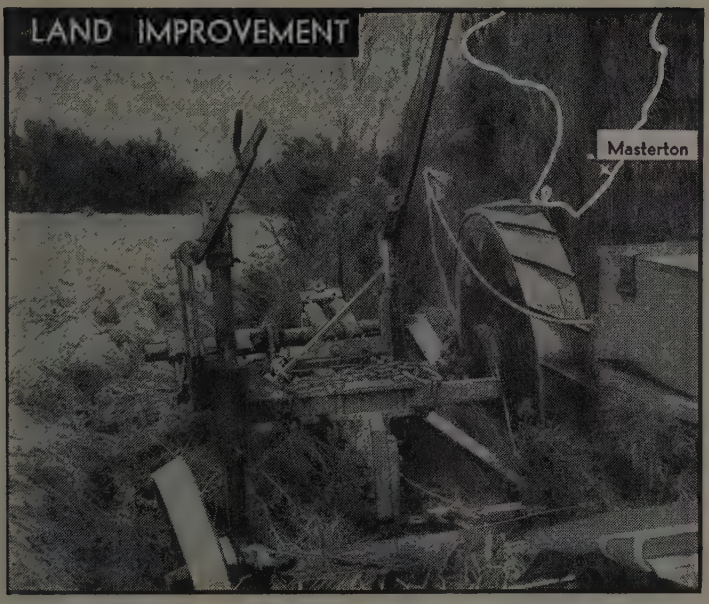

Breaking in Wairarapa Hill Country

TO increase the carrying capacity of Wairarapa hill country from approximately 1 ewe to 1½ acres to between 3 and 4 ewes per acre has been the experience of Mr. R. S. King, of "Glenlean", near Masterton, and in this article C. M. B. Olivecrona, Machinery Instructor, Department of Agriculture, Wellington, gives an account of the land development methods which have achieved this.

THE "Glenlean" property of 2600 acres is approximately 21 miles south-east of Masterton and comprises flat to undulating country cut in places by steep gullies, and there are also some steep hill faces. The soils are free draining, sandy loams derived from sandstone. Before development much of the country was covered with heavy manuka.

In the development work which has been undertaken the principal implement in primary cultivation has been a large swamp plough which was made to the owner's requirements. It has a beam 10ft. 7in. long, the land wheel is 4ft. 1in. in diameter, and the mouldboard, 2ft wide with wings or tailpieces attached to it, is capable of turning a furrow 36in. x 18in. The plough is bridle constructed to allow free movement and to enable it to be readily pushed clear of obstacles by reversing the tractor.

A medium tracklaying tractor has been used, across the front of which a rolled steel joist has been welded. The beam is about 18in. from the ground and projects about 1ft. on each side of the tracks. It pushes down the manuka uniformly one way and this helps to get a good coverage with the plough; also the bar acts as a preliminary breaker of the heavier scrub.

WORKING TIMES AND SEQUENCE OF OPERATIONS ON 72 ACRES

Date	Implement used	Strokes	Total implement hours	
1949				
September	Heavy plough ..	1	504*	Fallow following ploughing
1950				
September ..	Giant disc ..	1	72	
October ..	Giant disc ..	2	115	
October ..	Tandem disc ..	2	96	
October ..	Rolling	1	21	
October ..	Sowing	1	42	Chou moellier
October ..	Rolling	1	21	
1951				
September to November	Giant disc ..	2	96	
November to February	Tandem disc ..	3	144	
March	Rolling	1	21	
March	Sowing	1	42	Pasture
March	Rolling	1	21	
Total implement hours			1,195	

* Preliminary work before and during ploughing is included in this figure.

HEADING PHOTOGRAPH: Ploughing under heavy scrub in one operation at "Glenlean". The cross on the map indicates the location of the farm.

Development Procedure

The development procedure now adopted is to break down some of the scrub and give the area one cut with giant discs. This is done as one operation. This treatment is immediately followed by working with the large plough, which successfully buries most of the scrub. The area is then left in fallow for 8 to 12 months. Subsequent workings with giant and tandem discs seldom bring to the surface any of the buried scrub. Harrowing is not done, as this tends to bring pieces of scrub to the surface.

The sequence of operations for a block of 72 acres and the times involved are set out in the table at left below.

The table shows that a considerable amount of time is involved in working the land and that the development work is spread over 2½ to 3 years.

Fertiliser and Lime

With the crop lime was applied at 1 ton per acre and superphosphate at 3cwt. per acre, and with the pasture the application was 1 ton of lime and 2cwt. of superphosphate and 1cwt. of blood and bone per acre.

The pasture mixture was 32lb. per acre comprising 15lb. of perennial ryegrass, 5lb. of short-rotation ryegrass, 3lb. of white clover, 4lb. of cowgrass, and 5lb. of cocksfoot.

Costs

The cost of bringing in the block of 72 acres was approximately as follows:—

Costs	£	s.	d.
Tractor running	653	10	0
Implement	119	10	0
Labour	290	0	0
Lime	237	12	0
Fertiliser	253	16	0
Chou moellier	48	12	0
Pasture seed	303	3	0
Cartage	17	0	0
	£1,923	3	0
Cost per acre	£26	14	3

Against this cost an allowance would have to be made for the value of the feed crop of chou moellier. The tractor running costs and the costs of operating the implements include depreciation, maintenance, and interest on the value of the tractor and implements.

On the basis of present prices and costs it is estimated that the gross return before development would be approximately £3 5s. per acre and after development approximately £15 per acre, and the cost of maintenance dressings of lime and superphosphate for the paddock would be about £1 7s. per acre.

The Acidifying Effect of Sulphate of Ammonia

THE glasshouse tomato grower, market gardener, or orchardist frequently overlooks the acidifying effect of sulphate of ammonia. In this article K. J. McNaught, Horticulture Liaison Officer, Department of Agriculture Rukuhia Soil Research Station, discusses the problem and emphasises the need to lime soils treated with this fertiliser to maintain the soil pH at the required level.

IN the horticultural work of the soil advisory service frequent examples have been noted of quite low pH's, often below 5.0, in soil types which normally show satisfactory tests. In nearly all cases heavy dressings of sulphate of ammonia have been used as the source of nitrogen and little or no lime has been applied.

Sir John Russell in his book "Soil Conditions and Plant Growth" has described the effect of sulphate of ammonia as due to two steps. First, exchangeable bases, especially calcium, are displaced by the ammonium ions. The displaced calcium is then washed out of the soil in association with the sulphate introduced in the fertiliser. Secondly, the ammonia is nitrified and the nitrate ions produced are neutralised again by calcium. If the plants take up the nitrate, the calcium is reabsorbed by the soil, but any nitrate not absorbed carries away an equivalent amount of calcium in the leachings. If none of the nitrate is lost, 75lb. of calcium carbonate will theoretically be needed to make good the loss of calcium through the addition of 100lb. of ammonium sulphate, but if all the nitrate is leached out, 150lb. will be required. Normally the amount needed is about 100lb. to 120lb.

From work at the Soil Research Station plots on Horotiu sandy loam it appears that this displacement of plant nutrients and the effect on soil pH can be appreciable, especially on unlimed soils. At the beginning of this work the pH of the unlimed soil was approximately 5.6 and the calcium test 6 units (milliequivalents per cent.), both being fairly satisfactory levels for this particular soil type, a free-draining yellow-brown sandy loam. After a total of 1 ton of sulphate of ammonia per acre had been applied over 6 years the pH had dropped on the average from 5.6 in the no nitrogen plots to 5.0 in the unlimed sulphate of ammonia plots, calcium from 6 to 3 units, and magnesium from 0.34 to 0.18 units. The reduction in calcium and magnesium tests was not accompanied by any increase in plant uptake of these nutrients, and therefore the evidence is that the displaced nutrients were lost by leaching. On the plots which received 6 tons of lime per acre the pH dropped with the sulphate of ammonia treatments from 6.8 to 6.4 and the calcium and magnesium levels were also lower, but these differences were not sufficient to affect plant growth. The limed sulphate of ammonia plots showed an average magnesium test of 0.45 units compared with only 0.18 in the unlimed plots which are now showing slight symptoms of magnesium deficiency in susceptible plants. Liming, therefore, has reduced or eliminated the adverse effects of the applied sulphate of ammonia.

Yields varied from season to season and were complicated by deficiencies of other nutrients, but some outstanding effects were evident. Onion crops were poor on all unlimed plots which received sulphate of ammonia, the crops being almost a total failure on the most acid plots (pH 4.6 to 4.9). Carrots were affected to a less extent. It appears that on this soil type onions and carrots require a pH above about 5.5.

Free Bulletins for Market Gardeners and Orchardists

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The above bulletins, part of a series of over 350 on all aspects of farming, are available post free from the nearest office of the Department of Agriculture, or from the Head Office of the Department, Box 2298, Wellington.

Plants of the beet family were severely affected on the plots which received potash and sulphate of ammonia but only a light dressing of phosphate, whereas the corresponding limed plots produced well. On the other hand, the lime effect on yield was much smaller, and sometimes nil, on the highly phosphated plots. These facts, together with plant analytical evidence, indicate that the adverse effect of low pH on this soil resulting from the use of sulphate of ammonia is due in part to increased fixation of applied phosphate.

Similar but smaller adverse effects were noted in other plants on the low phosphate plots, and here again increased phosphate fixation may have been a contributing factor. Yields of clovers were reduced to about half, ryegrass and cabbages to a less extent, and even potatoes were affected last season. Plant analytical levels and visual symptoms suggest that magnesium deficiency was partly responsible for reduced yields on the unlimed plots.

The above effects were obtained with quite moderate amounts of sulphate of ammonia and on a soil which resists pH changes. Though this soil is described as a sandy loam, it has certain properties characteristic of "heavier" soils, as it is fairly high in organic matter and has moderate amounts of clay colloids and therefore a relatively high exchange capacity (approximately 30 milliequivalents per cent.). Such a soil requires a lot of acid or liming material to alter its pH. Therefore greater effects of sulphate of ammonia on pH tests on many other New Zealand soils of lower capacity or lower resistance to pH changes can be expected.

The results illustrate the serious effects on yield which can arise from heavy applications of sulphate of ammonia to soils of medium pH if lime is not used to counteract the acidifying effects of this fertiliser. On Horotiu sandy loam the problems appear to be associated with increased phosphate fixation and magnesium deficiency, but on other soils manganese toxicity, calcium deficiency, molybdenum deficiency, or adverse effects on soil structure may be involved.

Sulphate of ammonia should give good results if the following conditions are observed:—

1. If the soil pH is much below the desired value, for example 5.0 when 6.0 is optimum, sulphate of ammonia should be used only after the pH has been raised. Normally ground limestone is advised, but with magnesium-deficient soils dolomite (calcium magnesium carbonate) or talc magnesite (magnesium carbonate and silicate) may be used.
2. If the pH is close to optimum, sulphate of ammonia should be safe, but provision should be made to offset the acidifying effect before the next crop by applying approximately 1½cwt. of ground limestone or equivalent for every hundredweight of sulphate of ammonia used.
3. If the pH is too high, especially above about 6.7, sulphate of ammonia is advised in preference to other sources of nitrogen because of its acidifying properties.

Commercial Raspberry Production in the Nelson District

By I. L. BROWN, Horticultural Instructor, Department of Agriculture, Nelson

RASPBERRIES have been cultivated in the Nelson district for over 60 years. Local jam and canning factories absorb the greater part of the total crop, but there is also a considerable trade in both jam and dessert berries with consumers at local and more distant centres of population. About 40 years ago production was considerably higher than it is today, the annual crop being reputed to have been as much as 1200 tons. Today the average annual production is about 300 tons.

RASPBERRY culture apparently began in the province on the flat land along the Motueka River valley in the districts of Ngatimoti, Orinoco, Pangatotara, and Riwaka. Today this land is used for growing a variety of other crops including other fruits, tobacco, and hops. The largest acreage of raspberries is now in the Motupiko-Tadmor area, where the first garden was established just over 50 years ago. Encouraged by good crops and the demand for fruit the industry flourished until the late 1920s and early 1930s, when several factors contributed to a recession in production. Diseases hastened the decline of old-established gardens and low prices made other crops more attractive to growers. More recently production has been barely sufficient to meet the full market requirements and an increase in the tonnage of produce has become desirable. Existing gardens are endeavouring to increase production by the better cultural methods demonstrated by research, by replacement of old, declining gardens, and by increases in area.

As the table on page 419 shows the majority of the gardens are not large, only 12 being of 4 or more acres. All gardens are associated with other kinds of farming such as dairying, sheep farming, tobacco, potato, and hop growing, and general mixed farming.

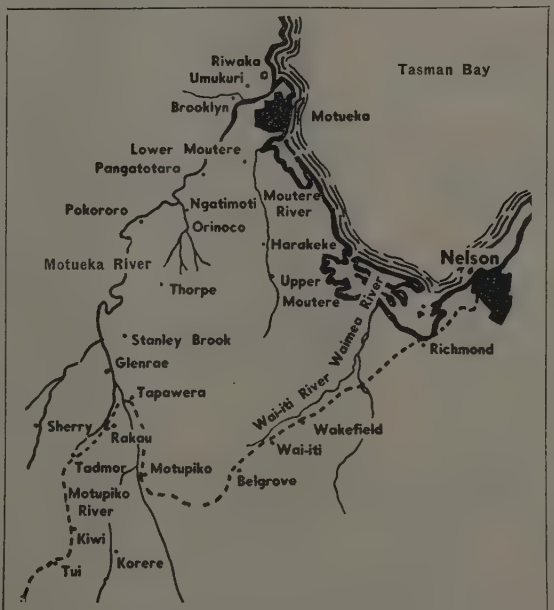
Soils

Mainly the gardens are situated where conditions are excellent for the growth of raspberries. The soils (1) are texturally suited and the rainfall and temperature range are good.

The soils of the Tadmor and Motupiko Valleys are alluvial loams derived mainly from Moutere gravel formation. In texture the soils vary from sandy loam to light loam. They are acid and are naturally low in phosphate and potash. The soils of the neighbouring Sherry Valley are alluvial sandy loams derived in great part from granite wash with some admixture of Miocene clays and mudstones from the eastern side of the valley. They also are acid and low in phosphate and potash.

The soils of the Wai-iti Valley are variable in texture, but those used for raspberries are mainly sandy loams or light loams. They are derived largely from the Moutere Hills wash, but have some admixture from the Triassic formations at the head of surrounding valleys. They are acid and low in phosphate with a moderate supply of potash. The soils of the Orinoco-Ngatimoti district are sands and sandy loams derived mainly from granite formation. They are acid and have a fair supply of phosphate and potash.

The Motueka and Riwaka soils used for raspberries are usually sands and sandy loams which have a better base than similar soils in other parts of the district. They are well supplied with phosphate and have a moderate supply of potash. The raspberry soils of Lower Moutere are light loams derived from the Moutere formation with some granite admixture and are somewhat similar to the Tadmor and Motupiko soils.



Places in Nelson district where raspberries are grown. The dotted line indicates the railway.

Varieties of Raspberries

The variety of raspberry most extensively grown is Red Antwerp. Lloyd George is also grown, but is confined to small areas mostly in gardens with a direct to consumer trade. Red Antwerp crops well and has an attractive colour and excellent jam-making qualities. The canes have an upright growth habit suitable to the hill system of planting generally adopted in Nelson gardens.

The total net acreage of Red Antwerp grown is 138, of Lloyd George, 19, and of others, including Superlative, Fillbasket, and varieties under trial, about 1.

Economic Life of Gardens

Many gardens have been kept in production beyond the accepted economic life, but some replacement is now taking place or being planned. A few gardens over 20 years old still exist, but it is apparent that at this age cropping is not up to the standard of that of younger gardens. The best crops are produced by gardens under 15 years of age.

Systems of Planting

New plantings are usually made in July or August as soil conditions permit. The land is well prepared by ploughing and cultivation before planting to ensure good growing conditions and freedom from serious weeds.

The hill system of planting is general in the Nelson district. To establish a garden on this system a number of canes are planted in groups (to form what are known as hills) at the required distances apart. There are usually five canes to each group. The distance between rows and between the hills in the rows varies according to the kind and size of the cultivating machinery to be used. Many Nelson raspberry growers still prefer a single-horse plough and cultivator for work in the gardens, but many also use the powered garden cultivator. Small wheeled or tracklaying machines are also used. A number of gardens which have the rows far enough apart, at least one way, to permit the passage of the usual farm tractor combine these methods of cultivation. When the tractor has done the main cultivation in the wide rows early season cultivation between the hills

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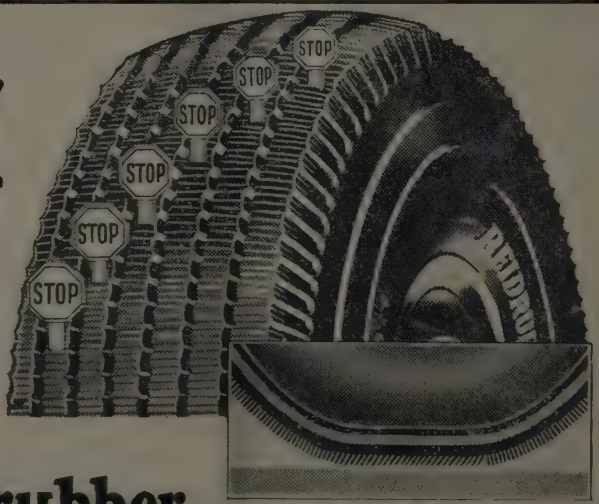

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RAS-1

Pruning of bushes. Below—Bushes before pruning. Right—Bushes pruned and tied but not topped.

in the rows is done with a garden cultivator or a horse plough. One advantage of the hill system of planting is that it permits cultivation along and across the rows.

Planting distances therefore vary considerably, but the most common are 6ft. x 6ft., 5ft., or 4ft. Other distance variations range from 6ft. x 3ft. to 8ft. or 9ft. x 3ft. or 4ft.

Pruning

After a new garden is planted the canes are cut back to discourage fruiting and encourage new cane growth. In establishing gardens pruning is begun in autumn after the canes have lost their foliage. All canes that have fruited are removed to ground level and a number of new season's canes are thinned to suit the grower's requirements. The number of canes left per bush depends on the vigour of the growth, but it is usual to leave at least 12 canes. Over double this number are left in most gardens. After pruning the canes are tied together near the tops. This tie, slightly below the height at which they are to be topped, keeps the bushes upright, allows free passage of cultivation and spraying equipment, and supplies all the support required throughout the season.

After the canes have been thinned and tied all the canes remaining in each hill are topped at a height of 3ft. 6in. to 4ft. This removal of the thinner, top part of the canes is done to ensure an even bud break for fruiting laterals, and it also removes the parts of the canes commonly infested with bud moth larvae. All prunings are carried from the garden and burnt.

Cultivation

After and sometimes before pruning many growers plough on to the rows to leave open furrows in the centre to run off excess water and leave the soil open to the action of frosts. In early spring as soon as soil conditions permit intensive cultivation is begun. The first ploughing is away from the canes and is from 4in. to 6in. deep and as close as possible to each side of the rows. The soil in and around each hill is then hoed away and the fertiliser applied before the soil is ploughed or disced back. Subsequent cultivation is by a one-horse cultivator or similar tractor-drawn cultivators. Each garden is cultivated 6 to 8 times during the season.

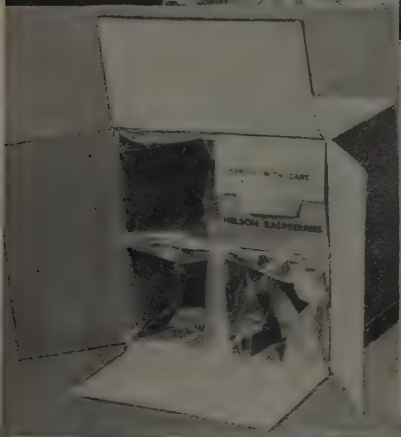
Fertiliser

Fertiliser mixtures applied vary in ingredients, but each is designed to supply sufficient of each of the main elements required to ensure good cane growth without making it over-

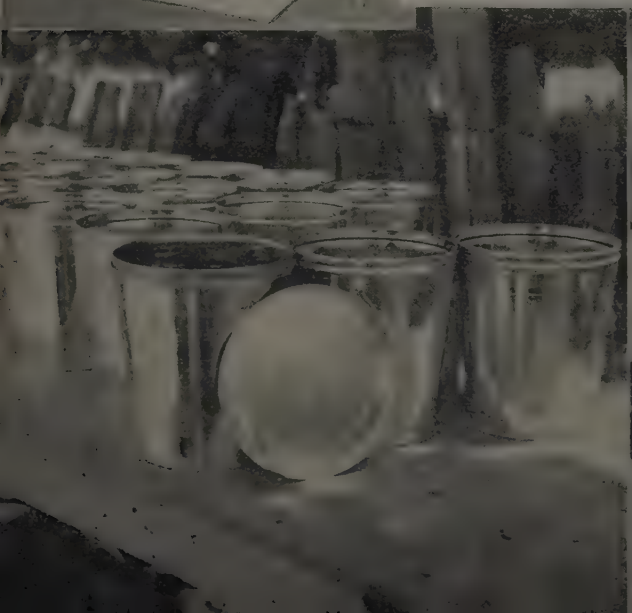
NUMBERS AND NET ACREAGES OF GARDENS GROUPED IN DISTRICTS
(Total area including headlands = 190 acres)

District	Under 2 acres		2 and under 4 acres		4 and under 5 acres		5 and under 8 acres		8 acres and over		Total No. of gardens	Total acreages
	No.	Acres	No.	Acres	No.	Acres	No.	Acres	No.	Acres		
Tadmor-Glenrae, Motupiko-Korere	8	10	14	35	5	24	3	22	2	19	32	110
Riwaka-Umukuri Brooklyn ..	7	3½	2	5	—	—	—	—	—	—	9	8½
Orinoco, Ngatimoti, Pokororo, Pangatotara ..	9	7½	1	3	—	—	—	—	—	—	10	10½
Moutere, Harakeke, Motueka ..	6	7	—	—	2	9	—	—	—	—	8	16
Belgrove, Wai-iti, Wakefield ..	3	3	1	2	—	—	—	—	—	—	4	5
Other areas	6	5	1	3	—	—	—	—	—	—	7	8
Totals	39	36	19	48	7	33	3	22	2	19	70	158

HARVESTING AND PACKING OF BERRIES



All picking is done by hand and to meet the demand for labour pickers are recruited from other centres. The berries are picked into packing tins or punnets according to their firmness and the purpose for which they are intended. Upper left—The picking tin is strapped to the picker's waist to leave the hands free. Upper middle—Picking into punnets. Upper right—Barrels used for sending jam berries to a factory. Middle left—A carton containing four 6lb. cartons. Middle right—A tin and punnets of berries ready for market. Lower left—Lidded pails which hold up to 16lb. of berries each. Lower right—Punnets of berries for canning or dessert packed in cases ready for dispatch.



vigorous to the detriment of fruiting. Superphosphate, blood and bone, dried blood, sulphate of potash, and sulphate of ammonia are combined in various ways. These mixtures vary considerably, but the best of them on analysis show about 10 per cent. phosphorus, 7 per cent. nitrogen, and 5 per cent. potash. Rates of application range from 5cwt. to 10cwt. per acre. Borax is applied at 3- to 4-year intervals at ½oz. per hill to supply boron, an element which is deficient in most Nelson soils.

Lime is not used extensively, only light applications being made at long intervals to ensure that the soil does not become too acid. Areas for new plantings often receive ½ ton of lime per acre during initial preparations. A slightly acid soil with a pH of between 5.6 and 6.5 is considered best for raspberries.

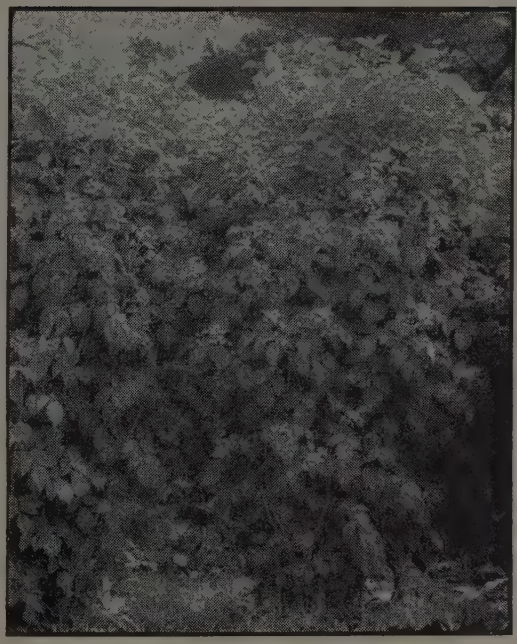
Production

The total crop per garden varies considerably, ranging from 1½ tons to over 3 tons per acre. Much higher yields appear to have been obtained in the earlier days of the industry, and it has been demonstrated on experimental plots that a yield of over 4 tons per acre is possible on Nelson soils.

Adverse weather, particularly during January, when strong winds and dry periods are often experienced, sometimes curtails production. Irrigation during such periods should aid production. Spray or similar overhead systems of irrigation could be installed in many Nelson gardens, as most are situated close to rivers or streams.

Harvesting

All picking is done by hand and to meet the demand for labour pickers are recruited from other centres under arrangement with the Department of Labour and Employment. Many people take the opportunity to engage in this work during their summer holidays, as the picking season extends from late December until the end of January or early February. Accommodation, either single or multiple self-contained units, is provided at the gardens for pickers as shown in the illustration on page 423. As many as 15 pickings may be made in a season, but in most gardens the average is 6 or 7, the number being governed by the size of the garden, the number of pickers employed, and the manner in which the berries mature. The berries are picked into picking tins or punnets according to their firmness and the purpose for which they are intended. A method of holding tins and punnets for picking is shown in the illustrations on the opposite page. When being picked into punnets the raspberries are usually graded for firmness. The upper midde illustration shows raspberries being picked into punnets, two for firm berries for canning or dessert and one for the softer, more mature berries, which would not carry well but are suitable for jam.



Six-feet high Red Antwerp bushes.

A small rotary cultivator working between the rows.

Marketing

Except for those from a few small gardens which deal directly with the public all raspberries are marketed through the Nelson Raspberry Marketing Committee, which negotiates prices with canning and other firms, sets wholesale prices, and arranges distribution. The committee operates under the Nelson Raspberry Marketing Regulations 1940, made under the Primary Produce Marketing Act 1936.

Various types of containers are used for conveying the fruit to factory or market. Jam fruit is sent direct to the factories in barrels of various shapes and sizes. Some of the small, more easily handled type of barrel common in the early days are still in use.

Jam fruit for domestic use is contained in various types of tins and pails. Open tins such as that shown in the middle right illustration on the opposite page are commonly used for direct sales, but fruit for distribution to more distant markets is usually contained in pails (see lower left illustration on opposite page) or plastic bags. The latter are a recent introduction, and each bag holds 6lb. of fruit. The bag is placed in a waxed carton, and four cartons fit into a cardboard container. This makes a compact package suitable for all kinds of transport including air. The outer container is returnable. (See middle left illustration on opposite page.) Fruit for canning and deep freeze processes, which require a firmer berry than that used in jam manu-

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facture, is picked into punnets, 24 of which are weighed and then packed in layers of eight in cases which are lidded for transport. (See lower right illustration on opposite page.) Each layer is separated by a loose tray. Punnets and similar methods of packing are used for sending dessert berries to market.

Nelson lacks direct rail communication with the rest of the South Island and road transport is used for most fruit. Since the regular passenger steamer service between Nelson and Wellington was discontinued most of the fruit for North Island markets has been carried by air.

The Raspberry Marketing Committee also bulks and freezes in tins quantities of berries for distribution to manufacturers in other centres. These berries are frozen in Nelson and held in the same state by the manufacturer until required.

Trials have also been made with dehydration of berries. The small quantities so treated have dried very satisfactorily, and further trials of this form of processing are still being carried out.

A view of a raspberry garden showing rows of hills.

Diseases and Pests

Apart from garden hygiene, which includes removal and destruction of prunings, growers control pests and diseases with various sprays. The complete spray programme recommended by the Horticulture Division is:—

Application	Period of application	Specific
1	Delayed dormant	Lime sulphur 1:16
2	Green tip	Bordeaux mixture 5:4:50 + lead arsenate 2lb.:100 + spreader 4oz.:100
3	4 weeks later	Bordeaux mixture 3:4:50 + lead arsenate 2lb.:100 + spreader 4oz.:100
4	4 weeks later	Repeat 3
5	After harvest	Bordeaux mixture 3:4:50 + D.D.T. 50 per cent. wettable powder 1lb.:100 + spreader 4oz.:100
6	Half foliage fall	Bordeaux mixture 3:4:50 + lead arsenate 2lb.:100 + spreader 4oz.:100

If there is an infestation of bronze beetle, the inclusion of D.D.T. 50 per cent. at ½lb. to 100 gallons of the No. 3 spray listed is recommended, but it should not be used unless absolutely necessary, as the early use of D.D.T. kills the predators of red mite, which then may increase to a damaging degree. No. 5 spray is designed to control bud moth, and if red mite is prevalent, 2lb. of wettable derris powder (if available) plus ½ gallon of summer oil per 100 gallons is advised in place of the lead arsenate in No. 4 spray and the D.D.T. in No. 5 spray. (Some of the new materials designed to control mites may be effective, but these are still subject to trial.)

This programme suits Nelson district conditions, and if thoroughly applied, efficiently controls all diseases and pests commonly experienced.

Diseases and pests (2) occurring in Nelson raspberry gardens are:—

Fungous diseases: Cane spot (*Elsinoe veneta*), leaf spot (*Septoria rubi*), cane wilt (*Leptosphaeria coniothyrium*), spur blight (*Didymella applanata*), silver leaf (*Stereum purpureum*), and armillaria root rot (*Armillaria mellea*).

Rust (*Phragmidium rubi-idaei*) has been recorded in the district, but has not been observed in commercial gardens.

Insect pests: Raspberry bud moth (*Carposina adreptella*), red spider (*Tetranychus* sp.), brown beetle or grass-grub (*Costelytra (odontria) zealandica*), bronze beetle (*Eucolaspis brunneus*), rose scale (*Aulacaspis rosae*), lecanid scale (*Saissetia* sp.),

A multiple accommodation unit for raspberry pickers.

Bushes in the background show benefit from Bordeaux mixture sprays and application of boron.

and leaf roller caterpillar (*Tortrix* spp.).

Aphis idaei, the insect vector of virus in raspberries, has been recorded in Nelson.

Infestations of scale insects are not common, but a number of areas in some gardens have been found to be so infested.

Bacterial diseases: Crown gall (*Agrobacterium tumefaciens*) is known to be present in raspberry gardens, but has not proved troublesome.

Virus diseases: Though the insect vector of raspberry mosaic has been found in Nelson gardens, no positive identification of any virus diseases has been made.

Nutritional disorders: Blind bud, a nutritional disorder, is attributed to boron deficiency of the soil. Buds fail to break in the spring, leaving the canes bare of lateral growth.

Research

The advantages of efficient disease control have been demonstrated to the district by spray trials carried out in 1940-41 by the Plant Diseases Division, Department of Scientific and Industrial Research (3) and by spray trials and soil applications of borax by the Horticulture Division, Department of Agriculture, in 1948-50.

These trials demonstrated that Bordeaux sprays and borax applications gave increased yield and better cane growth as compared with no treatment under similar growing conditions (see illustration above).

Further research of interest to the Nelson raspberry growing industry is at present being carried out in two places. At the Levin Horticultural Research Station research includes various nutritional studies, comparison of methods of pruning, and planting and variety trials.

Raspberry cultural problems are also studied by the Cawthron Institute at the J.W. Marsden Research Farm and on growers' properties. Investigations include manurial requirements of raspberries and variety trials.

References

1. Nelson Raspberry Marketing Committee 1944, "Raspberry Culture in the Nelson District".

2. New Zealand Department of Agriculture Bulletin No. 258, "Raspberry Culture in New Zealand".

3. G. G. Taylor, "Experiments with Spray Treatments for Control of Diseases and Pests of Raspberries", New Zealand Journal of Science and Technology, vol. 27, No. 2, sec. A, pp. 83-90, 1945.

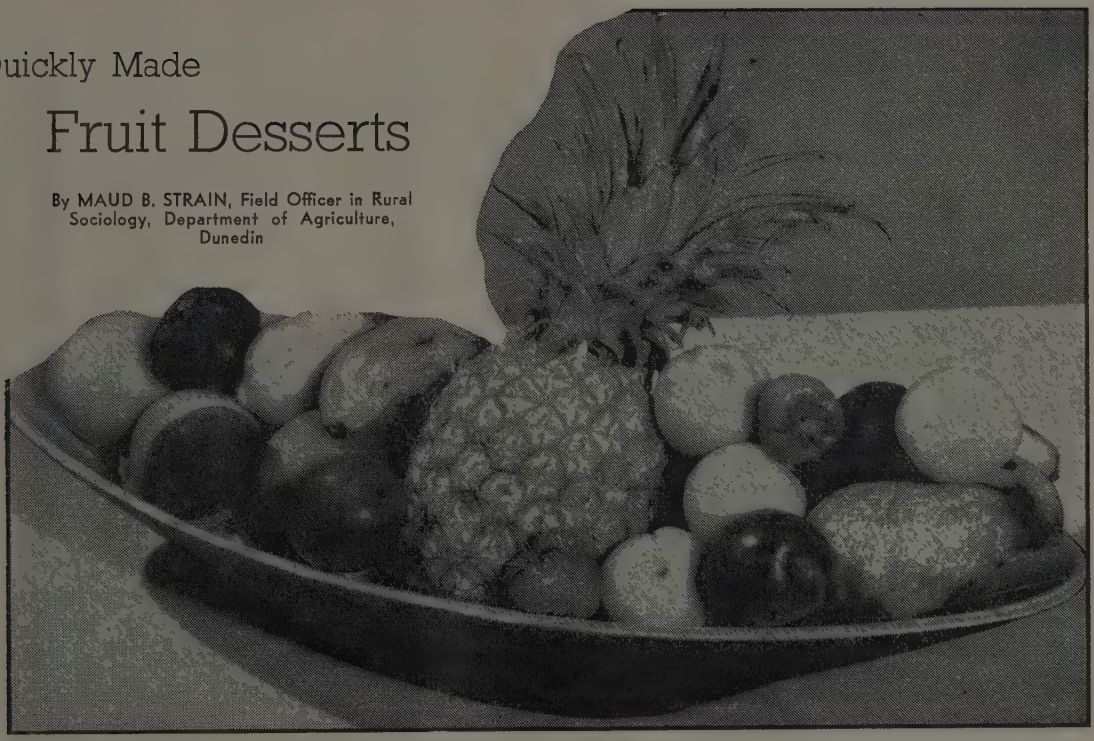
Meteorological Records for February

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in Inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Auckland	160	72.2	+ 5.5	84.0	60.0	6.34	10	+ 2.43	5.18	5	187.7
Tauranga	10	69.6	+ 4.6	85.2	52.4	0.93	8	— 2.80	0.40	5	171.0
Ruakura	131	69.2	+ 5.9	84.9	49.4	1.92	8	— 1.16	1.42	18	150.1
Rotorua	975	68.0	+ 5.1	87.0	51.3	3.50	12	— 0.25	1.01	18	128.4
Gisborne	12	70.6	+ 5.5	92.0	50.4	1.32	8	— 1.73	0.38	4	186.3
New Plymouth ..	160	66.2	+ 3.7	73.6	49.0	3.19	12	— 0.79	1.45	19	122.2
Kariol	2125	63.6	+ 6.0	78.0	42.0	5.36	14	+ 1.31	1.25	5	
Napier	5	70.8	+ 5.4	93.0	53.3	1.63	9	— 1.05	0.61	26	173.3
Wanganui	72	68.4	+ 4.7	86.2	50.2	2.46	12	— 0.51	0.84	26	166.7
Palmerston North .	110	67.6	+ 5.1	86.1	49.5	3.43	15	+ 0.34	1.09	26	160.8
Waingawa	340	66.6	+ 4.2	85.0	41.9	2.84	14	+ 0.03	0.88	18	132.9
Wellington	415	63.2	+ 1.9	75.0	48.8	7.23	13	+ 3.95	2.23	18	147.7
Nelson airfield ..	5	64.6	+ 3.4	77.9	45.5	6.61	12	+ 3.99	3.74	16	186.7
Blenheim	12	66.4	+ 3.6	83.1	44.4	4.42	10	+ 2.28	2.99	16	197.4
Hokitika	15	60.3	+ 2.2	70.3	41.0	18.88	14	+ 11.15	4.61	25	157.5
Hanmer	1270	61.5	— 2.1	84.0	38.0	5.69	14	+ 2.04	1.44	25	161.6
Christchurch ..	22	64.4	+ 3.6	91.2	45.8	3.60	11	+ 1.80	1.10	25	145.0
Ashburton	323	63.6	+ 2.6	91.0	39.6	2.32	9	— 0.37	0.55	16	126.2
Timaru	56	62.0	+ 1.8	87.9	46.3	3.23	12	+ 1.01	0.85	16	115.7
Alexandra	520	62.5	+ 1.1	83.9	41.8	1.35	10	— 0.12	0.45	16	174.8
Taieri	80	58.2	+ 0.5	79.6	39.7	2.36	13	+ 0.05	1.08	16	
Invercargill airfield	0	55.9	— 0.3	81.4	32.0	2.84	13	— 0.51	0.74	23	163.7

Quickly Made

Fruit Desserts

By MAUD B. STRAIN, Field Officer in Rural Sociology, Department of Agriculture, Dunedin



IT is fortunate that the warmest days of the year are during the season when fruit is plentiful and its variety greatest. In this somewhat limited period fresh fruit, either raw or cooked, is preferred above most other desserts. For good health this is most satisfactory; from the point of view of the one doing the cooking it is excellent, because most fruit desserts are easy to prepare. Any preparation apart from that required to serve fresh fruit attractively can be done at a time to suit the housewife rather than at a time dictated by the proximity of the meal hour.

MOST fresh fruits when thoroughly ripe are suitable for serving raw. In this way the full value of the fruit is obtained without the partial loss through cooking of vitamin C. All fresh fruit should be washed thoroughly before serving, particularly as fruit trees are often sprayed with materials which are poisonous.

Reasons for Cooking Fruit

Sometimes it is desirable to cook fruit to obtain variety, to develop its palatability, to make it keep longer, to make it more interesting, or to soften it. Slightly under-ripe and blemished fruits may be quite acceptable when cooked.

Strawberries and raspberries will keep longer when cooked, gooseberries customarily eaten while still green are cooked before serving, and quinces are never eaten raw. Pineapples are most often eaten in the tinned form, partly because the preserved fruit is more readily available, perhaps because of the irritant effect of the fresh fruit on the lips, and partly because the uncooked fruit cannot be used in a gelatine dessert because it contains a substance which prevents gelatine from setting.

Method of Cooking

The method of cooking fruit is determined by the character of the product desired. If the end result is to be sauce, the fruit is stewed in the minimum of water, the sugar added near the end of cooking, when the fruit is soft, and the whole stirred vigorously. If the fruit is to remain whole, as in a compote, it is carefully cooked in syrup in a covered utensil. In this way the steam is retained, which aids in the cooking and prevents the escape of the more volatile compounds, which are responsible for some of the flavour. "Stewed" fruit for a flan or tart or to be served with junket, custard, or cereal should be cooked in this way, as should strawberries, raspberries, and fully ripe apricots and peaches.

On the other hand some hard varieties of pears should be cooked in water first and the sugar added later in the cooking. Fruits soften more readily when cooked in water than when cooked in syrup, because the sugar usually displaces some of the liquid in the fruit and this has the effect of making it less juicy and somewhat firmer.

Some recipes such as fruit mousses, whips, gelatine sponges, and Bavarian creams require the fruit to be in the form of sauce or pulp. For pulp the fresh fruit is either mashed roughly with a fork or pressed through a sieve; cooked fruit is drained of its juice and treated similarly. Fresh raspberries, strawberries, and peaches are particularly good in sponges and creams.

Ice cream can be given individuality by serving it with a fruit topping or other attractively flavoured and coloured sauce. These sauces are suitable also for serving with sliced fresh fruit (bananas, peaches, apricots, and and similar fruits), baked fruit (for example, bananas), or with steamed puddings.

Using Raw Fruit

Ambrosia

2 medium size oranges
2 ripe bananas
2oz. of sugar
¼ to ⅓ cup of coconut

Peel the oranges and cut them crosswise into thin slices, removing seeds

and fibrous portions. Peel the bananas and slice them about ¼in. thick. Arrange alternate layers of orange and banana slices in a large shallow dish and sprinkle each layer with sugar. Use orange slices for the bottom and top layers. Sprinkle the top with coconut and chill for about an hour before serving. Garnish with additional ripe banana slices and orange sections.

Apricot Baskets

Ripe apricots
Strawberries
Whipped cream

Wash the apricots and remove the stones. In the centre of a wide glass dish pile some stiffly whipped cream. Place the apricot halves around it, fill them up with strawberries, and put a little whipped cream on top.

Recipes with Gelatine

Apple Flummery

1oz. of gelatine
¼ cup of water
2lb. of prepared apples
4oz. of sugar
¼ pint of water
Grated rind and juice of 1 lemon
½ pint of cream

Soak the gelatine in ¼ cup of water for 10 minutes and then dissolve it over gentle heat. Cook the apples with ¼ pint of water and lemon rind and juice until soft, add the sugar, and beat them to pulp. Add the dissolved gelatine and allow the mixture to cool. When it is almost cold stir in ½ pint of cream and turn the flummery into a mould to set. Unmould it and serve with whipped cream.

Lemon Whip

1oz. of gelatine
8oz. of sugar
¼ pint of cold water
¼ pint of lemon juice
¾ pint of boiling water
2 stiffly beaten egg whites

Custard

2 egg yolks
½ pint of milk
1oz. of sugar
½ teaspoon of vanilla essence

Soak the gelatine in cold water. Add the boiling water and when the gelatine has melted add the sugar and stir until it has dissolved. Add the lemon juice and cool. When the gelatine mixture starts to thicken beat it until it is light and frothy and fold in the stiffly beaten egg whites. Serve with custard made from the egg yolks, milk, and sugar heated in a double boiler and stirred until the mixture coats the spoon. Cool and add the vanilla essence before serving. Serves 6.

Variation: Substitute hot fruit syrup for most of the boiling water and any fruit pulp and the juice of 1 lemon for the ¼ pint of lemon juice. Add the fruit pulp and the egg whites when the gelatine mixture shows the first signs of thickening.

Rhubarb Flan

1lb. of rhubarb (cooked)
½oz. of gelatine
9in. pie shell (baked)
½ pint of whipped cream

Cook the rhubarb in syrup made from ½ pint of water and 4oz. of sugar. Drain the juice from the rhubarb. Soak the gelatine in 2 tablespoons of cold water and dissolve it in the hot juice. Arrange the rhubarb in a baked short pastry shell and when the gelatine mixture is almost cold pour it over the rhubarb and put it aside to set. Pile whipped cream on top immediately before serving.

Variation: Any other fruit may be used in place of rhubarb.

Desserts with Custard, Cream, or Cream and Custard

Fruit Trifle

¾ pint of custard
Strawberry jam
½lb. of stale sponge cake
½ pint of cream
¼ pint of fruit juice

Make the custard and leave it to cool slightly. Slice the sponge cake into finger lengths and spread them with jam. Arrange these in a glass dish and saturate them with the fruit juice. Cover them with custard and set aside until quite cold. Add sugar and flavouring to taste to the cream, whip it stiffly, and pile it on top. Serves 4 to 6.

Custard for Trifles

½ pint of milk
1 teaspoon of cornflour
1 egg
1oz. of castor sugar

Mix the cornflour to a thin paste with a little cold milk. Bring the rest of the milk to boiling point and add it gradually to the cornflour paste, stirring it well. Return this to the saucepan, add the sugar, and let the mixture cook for 3 to 5 minutes over gentle heat. Allow it to cool slightly; then pour it over the beaten egg. When the custard is only just warm pour it on to the trifle. The custard may be made with custard powder according to the directions on the packet.

Ambrosia. This is made of raw fruit, takes only a few minutes to assemble, and requires no covering.

Banana Trifle

8 bananas
1 wine glass of sherry
Strawberry jam
½ pint of milk
1 egg
2oz. of sugar
Vanilla essence
½ pint of cream

Skin the bananas, cut them in halves lengthwise, and lay them close together in a glass dish. Pour the sherry over the bananas and leave them for ½ hour. Spread them with strawberry jam. Make a custard with the milk, egg, sugar, and vanilla and pour it over the bananas. Whip the cream and pile it on top of the custard when cold. Serves 6.

Gooseberry Fool

1lb. of gooseberries
6oz. of sugar
¼ pint of water
¼ pint of cream (whipped) or ½ pint of thick custard

Cook the gooseberries in the water and add the sugar when they are nearly cooked. Press the fruit through a sieve and when quite cold add the stiffly whipped cream or custard. Serves 4.

Variation: Apple, rhubarb.

Strawberry Mousse

8oz. of strawberries
7oz. of castor sugar
½ pint of cream (whipped)

Mash the fruit finely with a fork, or, if preferred, pass it through a sieve. Whip the cream up stiffly, fold in the sugar and pulped fruit, and chill. Serves 4.

Rhubarb flan. Whipped cream, usually covering the whole top of the dessert, has been placed on only a small part of the flan so that the rhubarb set in jelly can be seen. Below—Fresh fruit set in jelly is a warm weather favourite.

[*Sparrow*

Above—Creamy lemon pie. Shell made from ginger nuts ground in a mincing machine.
Below—Chocolate sauce transforms ice cream into a special dessert.

[*Sparrow*

Variation: Raspberry, red currant, apricot, peach, passion fruit.

Orange Fool

6 oranges
3 eggs
1 pint of cream
Sugar
Nutmeg
Cinnamon

Squeeze and strain the juice from the oranges. Beat the eggs and add the cream and orange juice. Sweeten to taste. Add a sprinkle of grated nutmeg and powdered cinnamon and cook in a double boiler, stirring constantly until the mixture coats the spoon. When cool pour the mixture into glass dishes and chill before serving. Serves 6.

Banana-apricot Mousse

1 cup of mashed banana (2 bananas)
¾ cup of apricot pulp
3 tablespoons of lemon juice
¼ cup of apricot juice
¼ cup of castor sugar
¼ teaspoon of salt
½ pint of cream

Mash the bananas with a fork. Press stewed apricots through a sieve and stir in the banana pulp. Add the lemon juice, apricot juice, sugar, and salt and beat these well together. Whip the cream and fold it into the fruit mixture. Chill. Serves 6.

Raspberry Bavaroise

1lb. of raspberries
½ pint of cream (whipped)
1 pint of milk
2 eggs
5oz. of sugar

Make a custard with the sugar, milk, and eggs. Mash the raspberries with a fork and add them to the custard. Whip the cream and add it to the custard mixture. Chill and serve. Serves 8.

Variation: Strawberry, peach, red currant, apricot.

Apricot Fluff

2 cups of cooked apricots
½ cup of castor sugar
½ cup of cream (whipped)
1 cup of coconut

Pass the apricots through a sieve, add the sugar, and fold in the stiffly whipped cream and most of the coconut. Chill. Sprinkle the remainder of the coconut on top and serve. Serves 4.

Creamy Lemon Pie

8oz. of sugar
2oz. of cornflour
¼ teaspoon of salt
1 pint of milk
2oz. of butter
¼ pint of lemon juice
1 teaspoon of grated lemon rind
1 baked 8in. gingersnap pie shell
1 egg (slightly beaten)

Mix the sugar, cornflour, and salt in the top section of a double boiler. Add the milk gradually, mixing well. Cook over direct heat, stirring vigorously until the mixture is thickened and beginning to bubble. Add the butter, stir until melted, and remove from the heat. Add a little of this gradually to the egg, beating it in well. Pour the egg mixture back into the rest of the hot milk, stirring constantly. Add the lemon juice and rind, stir vigorously until it is blended with the mixture, and cook over simmering water for 2 minutes longer. Cool the mixture slightly and pour it into the shell. When the filling is quite cold top it with whipped cream. Serves 6 to 8.

A meringue case on a sponge cake base and filled with fresh strawberries.

Ginger Snap Pie Shell

½lb. of ginger nut biscuits
2oz. of butter

Put the ginger nuts through a mincer. To the fine biscuit crumbs add the butter, melted, and line an 8in. pie plate with this mixture; press it firmly on to the sides and bottom of the plate with the fingers or the back of a spoon. Bake the shell in a moderate oven (350 degrees F.) for 10 minutes. Allow the shell to cool before filling it.

Meringues

Meringues are made from stiffly beaten egg whites to which castor sugar is added in the proportion of 2oz. of sugar to each egg white.

2 egg whites
4oz. of castor sugar

Beat the whites until they are stiff and dry and will not slip in the basin if it is held on its side or inverted. Fold the sugar in lightly until the ingredients are evenly blended. Put the mixture out in spoonfuls on waxed paper on an oven tray and dry off in a cool oven 200 to 250 degrees F. for an hour or longer until they are firm. They may be served in pairs with whipped cream or singly, hollowed out, and filled with fruit and cream or ice cream.

Meringue Cases

Large cases may be made by piping meringue mixture in a large circle on a sheet of waxed paper. When cooked and cold the cases should be slipped off the paper—with a thin knife if necessary. The case can then be stood on a sponge cake base and filled with fruit and whipped cream.

Sauces for Serving with Ice Cream

Chocolate Sauce

2oz. of dark chocolate
¼ pint of boiling water
4oz. of sugar
½ teaspoon of vanilla essence
1oz. of butter (melted)

Melt the chocolate slowly in a double boiler, add the butter, and when they are thoroughly blended pour boiling water on gradually, stirring constantly. Add the sugar. Bring the mixture to boiling point and boil gently for 10 minutes. Cool it slightly before adding the vanilla. Serves 6.

Pineapple Sauce

1 small tin of crushed pineapple
½oz. of cornflour
2 tablespoons of lemon juice
4oz. of sugar

Drain the juice from the pineapple. Mix the cornflour and sugar with a little cold water in a small saucepan, add the pineapple juice, bring the mixture to boiling point, stirring all the time, and cook until thickened and clear. Remove from the heat and add the pineapple and lemon juice. Cool and serve over ice cream or with baked bananas or baked apples. Serves 4 to 6.

Red Currant Sauce

2 cups of fresh red currants
¼ pint of water
4oz. of sugar
2 teaspoons of flour
⅛ teaspoon of salt

Cook the currants in the water until they are soft. Press them through a sieve. Mix the flour, sugar, and salt with a little water, add the sieved currants, and cook over low heat, stirring constantly until thickened. Serves 4 to 6.

Mocha Fudge Sauce

2oz. of dark chocolate
¼ pint of strong coffee
3 tablespoons of milk
5oz. of sugar
1oz. of butter
⅛ teaspoon of salt
½ teaspoon of vanilla

Heat the chocolate, coffee, and milk together over low heat, stirring constantly until the chocolate is melted. Add the sugar, butter, and salt and continue cooking, stirring all the time, for 3 to 5 minutes or until the mixture thickens slightly. Remove it from heat, cool, and add the vanilla. Serves 8.

Native Trees and Shrubs for the Flower Garden

DURING the last few years New Zealand native trees and shrubs have become increasingly popular with gardeners as their value and uses have become better known. Though it cannot be denied that most of them are not as spectacular as many exotics, they have their place in the garden. In this article J. S. Say, Horticulturist, Department of Agriculture, Auckland, discusses their use in the garden and describes some of the newer varieties which could be more generally grown. The section on flower garden work for May is by M. Joanna Lockie, Horticultural Instructor, Department of Agriculture, Auckland.

A WELL-KEPT and well-laid-out shrub border is an asset to any garden. It will provide colour and interest throughout the year and compared with the work needed in keeping a herbaceous border or beds of annuals in order requires little attention. New Zealand has a number of shrubs which can be used to advantage.

Comparatively few native shrubs have showy flowers and an all-native border has to depend very largely on variations in colour, shape, and texture of leaves for its effect. Though such a border has points of interest for brief periods throughout the year when particular plants are in flower, it remains for the most part unchanging and tends to become monotonous.

By combining the best of our native shrubs with the best from other countries it is possible to plant a border which is ever changing and can provide interest the year round. It is often claimed that mixing New Zealand shrubs with exotics gives an incongruous effect and should not be done. Cotoneasters from the Himalayas, berberis from Japan, ceanothus from California, and prostantheras from Australia are mixed without hesitation and it seems unreasonable not to make use of New Zealand's own good shrubs with those from overseas to make a first-class border.

Since the first coloured manukas were discovered about 40 years ago a great many improved varieties have been introduced. During the last few years a number of excellent varieties, some produced by American hybridisers, have come on the market. Among the newer varieties are *Leptospermum scoparium* var. *sandersi*, a winter flowering form with large pink flowers deepening at the centre; var. *tancredi* with deep rose pink semi-double flowers; Red Damask with red double flowers and bronze foliage; Scarlet Carnival, with red double flowers; and Ruby Glow, blood-red double flowers.

Hebes (shrubby veronicas) may be obtained in a wide range of colours, heights, and leaf forms. Three of the showiest are *Hebe speciosa* (violet purple) and its varieties La Seduisante (rosy purple) and Violet Meikle (violet blue). Their main flowering season is in spring, but they frequently have a few flowers throughout autumn and winter. They grow to about 3ft. *H. carnea* forms a smaller bush about 2ft. high and has showy pink flowers in summer.

Clianthus puniceus (kaka beak) is known to all gardeners. Though it

HEADING PHOTOGRAPH: The effectiveness of this group of native plants depends mainly on variations in colour and texture of the foliage. The creamy white leaves of the variegated hoheria (left) and the light green of the tree fern are contrasted against the bronze leaves of the purple dodonaea and the purple and silver of the coloured variety of rangiora (centre background). In the foreground are three species of hebes and the native hibiscus *(H. diversifolius)* with large, pale yellow flowers. Sparrow photo.

produces a great wealth of flowers, they are often hidden by the spreading and drooping branches. It is much more effective if it is trained as a standard. This is done by removing all the side growths from a young plant, thus forcing all the strength into the main stem, which should be tied to a stake. The plant should be grown on with this one leader until it is about 2ft. 6in. high, when the tip is pinched out and the side growths on the top few inches are allowed to develop. Clianthus is also very effective when grown on the top of a bank where it can be seen from below.

For autumn and winter berries corokias are very useful. *C. cotoneaster* forms a dense mass of black interlacing twigs with small leaves and masses of small red berries. *C. cheesemani* is similar but with greyish leaves and yellow berries. *C. macrocarpa* and *C. buddleoides* are more strongly growing with erect, less dense growth. Both have leaves with silvery backs and large red and yellow berries respectively. In spring they all have masses of small yellow flowers.

In a shrub border consisting entirely of natives considerable use has to be made of shrubs with coloured and variegated foliage to give a little colour to what otherwise can be a rather sombre green mass. A number of variegated forms of pittosporum are now available. *P. crassifolium*, *P. tenuifolium*, and *P. eugenioides* all have varieties with creamy yellow variegations. In addition *P. tenuifolium* has three other very good varieties, *garnetti*, with cream and deep pink markings, *sandersi*, an improved form of *garnetti*, and *purpureum* with red-bronze leaves. A shrub suitable for the back of a large shrub border is *Brachyglottis repanda purpurea* (purple rangiora). Its large leaves are dark purple above and silvery white beneath, making it very attractive, especially when a slight breeze is disturbing the leaves. It is advisable to give it some protection from heavy frosts when young. In early spring it produces large heads of creamy flowers with a honey scent.

Some of the newer varieties of New Zealand flax have little resemblance to the plant with coarse dark green leaves which grows in many swamps. *Phormium tenax* var. *rubrum* has rich coppery bronze leaves and var. *tricolor* has creamy yellow variegations with a red edge. Both grow to only 3ft. to 4ft. and have slender, pliant leaves which make them very useful for floral work.

One of the most brightly coloured shrubs is the variegated form of taupata (*Coprosma baueri variegata*), which has yellow and green shining leaves. It is not such a robust grower as the ordinary taupata and has a slightly pendulous habit of growth. A few plants with silver or grey foliage are always effective in a shrub border. For this purpose *Senecio greyi* and *S. compactus* are suitable and have the added attraction of yellow, daisy-like flowers. Another greyish shrub is *Pachystegia insignis*. It has large leathery leaves, bright green and smooth above and a dense white furriness below. The flowers, held well above the foliage, are white and daisy-like and are good for cutting.

[*Sparrow*

Libocedrus plumosa (kawaka) forms a tall, symmetrical spire without any pruning and is excellent for specimen planting.

Besides containing shrubs with coloured and variegated leaves the border can be made more interesting by using shrubs with leaves of various shapes, sizes, and textures. For example, the large coarse leaves of parapara (*Pisonia brunoniana*) or rangiora are an ideal foil for the light, dainty, shining leaves of *Pittosporum eugenioides*, *P. tenuifolium*, and their varieties.

Two interesting forms of *Macropiper excelsum* (kawakawa or New Zealand pepper) are now available. *M. excelsum variegata* has an irregular creamy yellow mark in the centre of the leaves and variety *psittacorum* has very large, heart shaped leaves which are lighter in texture and paler green than the ordinary type. Its habit of growth is also more upright. Both will grow in open situations but are better under fairly heavy shade.

Pseudopanax is another genus in which there are a number of attractive species, hybrids, and forms. With *P. crassifolium* (lancewood) the juvenile leaves are long and narrow and very different from the compound leaves of the adult tree. One of the best species is *P. discolor*, a compact, much-branched shrub with rich bronze foliage.

Hedges

Of the native shrubs used for hedges pittosporums are the most popular and many gardeners regard them as the only suitable ones. However, there are a number of others which will make useful and attractive hedges.

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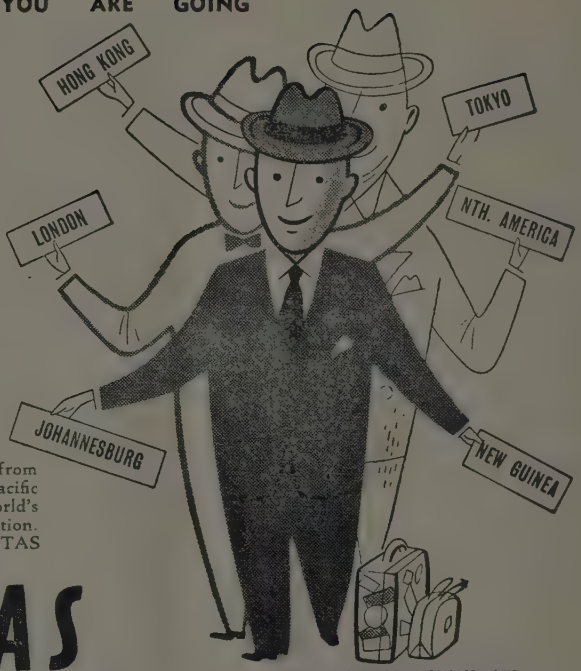

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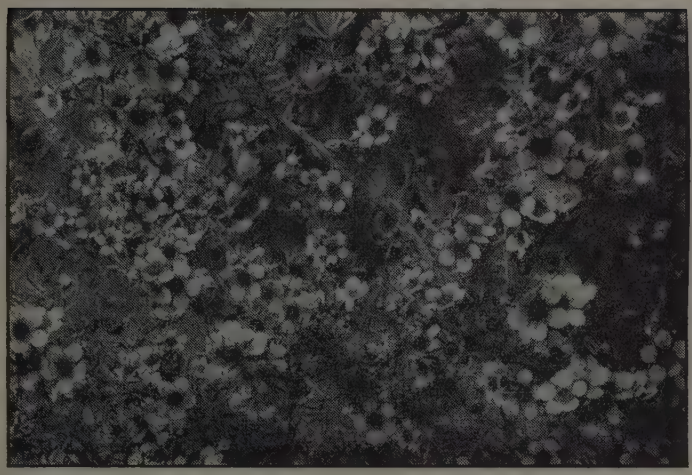
The coloured forms of manuka (*Leptospermum scoparium*) will make a very colourful hedge which can be kept compact and clothed to the base if they are trained from the time they are planted. Initial training should consist of pinching out the growing tips to encourage bushy growth, but later hedge shears can be used. *Corokia cotoneaster* is particularly suitable, especially for the seaside, but is rather slow growing. The other corokias can be used, but they do not form such a satisfactory hedge.

For a dwarf hedge or low division in the garden some of the hebes are excellent, but are very seldom used. *Hebe speciosa* and its varieties form rounded, compact plants about 3ft. high and about 3ft. across and if planted 18in. apart, form a low hedge with a rounded top. Hebe hedges can usually be kept in shape by removing the old flower heads, but an occasional trimming with secateurs may be necessary if there is any tendency to become straggly. An attractive edging which needs little attention can be made with some of the small-leaved types of hebe such as *H. buxifolia* and *H. diosmaefolia.*

In certain positions a hedge with a bronze appearance is an advantage, especially where it is used as a contrasting background to plants with light coloured foliage and flowers. *Myrtus bullata* (ramarama) can be formed into a good hedge. Its leaves are small, very glossy, and have a reddish-bronze tinge. During summer it has small white flowers followed by dark red berries. It is rather susceptible to attacks by scale insects, but these can be controlled by spraying with summer oil. Some manukas also have bronze foliage.



[*Elliott*

***Leptospermum scoparium martini*, with large rosy flowers and bronze foliage, is one of the best of the coloured manukas.**

Nurserymen are sometimes unable to supply in hedging quantities plants such as those mentioned, because they are outside the normal demand, and intending growers would be advised to place their orders well in advance.

[*Elliott*

The large heads of creamy white flowers of *Brachyglottis repanda purpurea* (purple rangiora) show up well against the purple leaves.

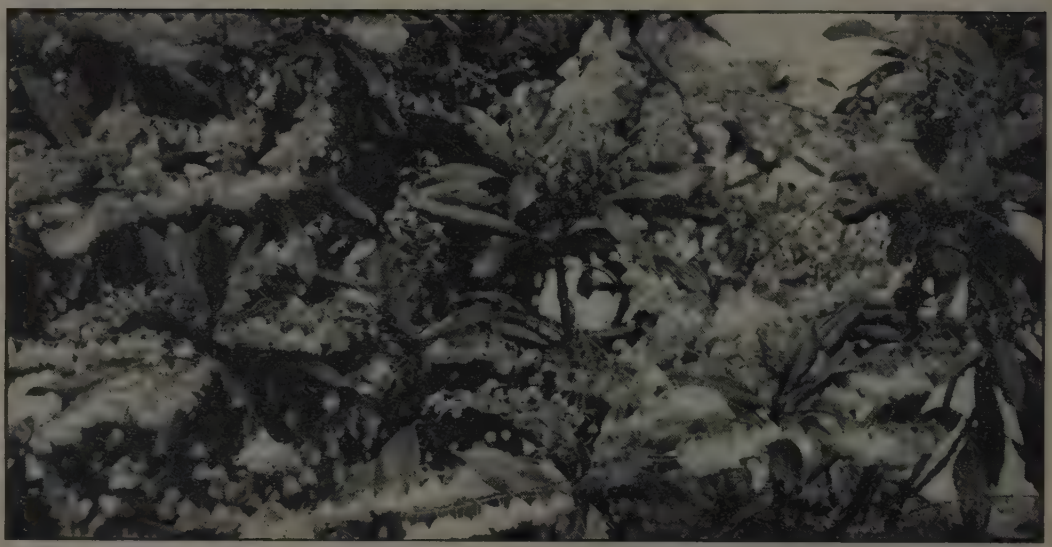
All the shrubs mentioned for hedges can be propagated easily by the home gardener. Seeds from the coloured varieties of manuka usually germinate readily and though they do not come absolutely true to type, most are sufficiently alike to make a uniform hedge. Seedlings which are obviously different from the majority can be set aside. Those with green leaves usually have flowers which are white or very pale pink and can be discarded, but those with dark leaves, especially if large, are worth keeping, as the flowers will probably be of very good colour.

Corokias grow easily from seed, but it is sometimes difficult to get an even line for hedging. Corokias hybridise very easily and if different species are growing in the same vicinity, it is likely that cross-pollination has taken place and the seedlings will show a big variation in growth habit and in the size, colour, and shape of the leaves and berries. Even when seed is collected from an isolated specimen there may be some variation in the seedlings, as the parent may itself be a hybrid. Raising corokias from seed can be very interesting, for if seed is collected from a group of different species, often a very good form will appear among the seedlings.

Myrtus bullata also comes quite easily from seed. All the hebes can be raised from cuttings made from young non-flowering shoots 3in. to 4in. long. They can be rooted at any time of the year when suitable cutting material is available.

Specimen Trees

The numbers of large trees planted in the middle of front lawns show that many gardeners apparently like to have a specimen tree. Trees of this type are very difficult to site correctly,



[*Sparrow*

Masses of creamy, bell-shaped flowers make *Elaeocarpus dentatus* (hinau) one of the showiest of native trees. The flowers, produced in late January, are followed by purplish berries.

especially in small suburban gardens, and very rarely is the middle of the front lawn the right place. When the planting of a specimen tree is being considered it should be visualised in its mature form. Then the gardener can make sure that it has room to develop and that it will not cast shade where it is not wanted or will not interfere with the view. The fact that a specimen tree has to have the top lopped off because it is touching the power lines or has to have the side trimmed or the lower branches removed because they are obstructing a pathway is a sign that someone has planted without sufficient thought. The neighbours' gardens, views, and sunshine should also be considered.

Most New Zealand forest trees are too large for the average town garden and should be left for those with large sections or planted in farm homesteads where space is not so limited. One of the most beautiful trees for specimen planting is the kawaka (*Libocedrus plumosa*), whose ultimate height is up to 50ft. Its symmetrical, pyramidal habit and pale green leaves make it ideal for this purpose. Other large trees suitable for planting where there is room are rimu, karaka, puriri, rewarewa, kohekohe, totara, tanekaha, pohutukawa, and kauri. Though the kauri is often recommended for drier situations, it will not stand prolonged drought. Many young trees, some up to 25ft. high, died during the dry spell in Auckland in the summer of 1954.

Two species which have produced attractive varieties with variegated leaves in recent years are *Corynocarpus laevigata* (karaka) and (*Metrosideros excelsa* (pohutukawa). One form of the karaka has silver markings throughout the leaves and the other a yellow edge. Several forms of pohutukawa with creamy yellow variegations and also a yellow flowered variety are available. None of these variegated forms is as vigorous as the ordinary kinds.

For smaller sections there are a number of suitable trees which because of their shape, size, and attractive leaves lend themselves to specimen planting. The hoherias (lacebarks) are good. *H. populnea* forms a shapely tree which is smothered in white flowers in autumn and its two variegated varieties, *alba variegata* and *aurea variegata*, are also suitable but not quite so hardy. *H. osbornei* is another species which flowers freely. The flowers are white with purple stamens and the under surfaces of the leaves also have a purplish appearance. In colder climates *Hoheria* (Gaya) *lyalli* is more suitable than the others because of its hardiness; in fact it does not like the warmer parts. During summer it bears masses of white cherry-like flowers and in winter loses most of its leaves, for it is one of the few deciduous or semi-deciduous native trees.

Closely related to the hoherias is another deciduous tree, *Plagianthus betulinus* (ribbonwood). Its leaves are much softer than those of the hoherias.

A tree rare in its wild state but becoming very common in gardens is *Meryta sinclairi* (puka), which bears dark green shining leaves up to 18in. long and 9in. wide. It makes a good specimen, but owing to its coarse appearance needs very careful placing and for this reason is not suitable for the average small garden.

Probably the best-known and showiest of New Zealand trees are the kowhais (*Sophora* spp.). They make good specimen trees, but it should be remembered that the two most commonly grown species, *S. tetraptera* and *S. microphylla*, grow to a height of 30ft. and sometimes higher. For the home garden *S. treadwelli* is often more suitable, as it is not so tall. The foliage is very small, but the flowers are large.

Tub Plants

Tub plants are becoming very popular and there are many places where they can be used to good effect such as a pair standing at the base of the steps leading to the front door or on a paved area against the wall of the house. Kawaka, though it will grow into a large tree if planted in the open ground, makes a very good tub plant which, with a little care, can be kept healthy and clothed to the base. Rimus, kauris, and pohutukawas are other large trees which do not object to being confined in tubs and make good specimens. Of the smaller trees or large shrubs *Pittosporum eugenioides variegata* is excellent and for something quick growing but not long lasting the purple leaved akeake (*Dodonaea viscosa purpurea*) is useful. New Zealand flax (*Phormium tenax*) also makes a good tub plant, the coloured varieties being particularly suitable.

Rock Gardens

Few rock garden shrubs can compare with the delightful dwarf form of manuka, *Leptospermum scoparium nanum*. Though the plant is small, usually not more than 6in. high, the flowers are large and almost completely hide the bronze tinted foliage when in full bloom. They are pale pink with a darker central zone. Other dwarf shrubs suitable for the rock garden are some of the small hebes such as *H. lycopodioides*, which belongs to the whipcord section and has small, scale-like leaves. The plant has a rich bronze appearance with dense heads of white flowers on the tips of the stems. *H. vernicosa*, *H. gracillima*, *H. decumbens*, and *H. bidwilli* are also suitable. A scrambling shrub which can be used in the rock garden is the little *Fuchsia procumbens*. The flowers are small and inconspicuous but are very interesting, for they are held erect and are rather strangely coloured. The tube is yellow, the sepals green tipped with purple, and the stamens light blue. The berries are large, red, and very showy. This fuchsia also makes an attractive hanging basket plant.

Cultivation and Training

Two common misconceptions about New Zealand's native trees and shrubs are that they will not stand manures or fertilisers and that they cannot be pruned. They should be given exactly the same treatment and attention as any other tree, both at planting time and after. They react most favourably to blood and bone, which should be incorporated in the soil when planting and as a topdressing later.

Most native trees and shrubs are not particular about the type of soil and will grow well on light or heavy soils provided drainage is good. It is most important that the soils should not dry out in summer, and for the first year or two especially watering should not be neglected. At all times a good mulch of compost or well-rotted animal manure, sawdust, or lawn clippings will help to prevent the soil from drying out.

Trees and shrubs which do not grow too large for their position should be selected so that no severe pruning or cutting back is required. Pruning can be done to advantage in a great many cases, but should be limited to that necessary to keep the tree in shape. Trees should be grown on a single trunk and if double leaders form later, they should be removed at an early stage as should any branches which spoil the symmetry of the tree.

The dwarf manuka, *Leptospermum scoparium nanum*, is an excellent subject for the rock garden.

Garden Work for May

Gardening in May really amounts to sprucing up the place in readiness for the days when it is impossible to garden, and unless old perennials are cut down, stakes removed, and dead annuals cleared away, the garden looks drear and depressing. Garden hygiene is as important in winter as at any other time of the year.

Long rank grass on boundaries or weedy, neglected areas should be tidied so that no cover is left to harbour pests such as slugs, snails, slaters, and green vegetable bugs. This cleaning up exposes hiding places to severe winter conditions, which destroy many pests that otherwise might survive.

All diseased plant material, including diseased weeds, should be burnt, but healthy garden waste may be composted.

Trees and climbers with branches near or overhanging power or telephone lines should be cut back. Strong winds may snap branches or the weight of rain may cause them to touch the wires.

Annuals

Spring flowering annuals and the hardier bedding plants can still be set out in well-drained soil. No organic manure or compost should be applied at this time, but a fertiliser mixture of 4 parts of bonedust and 1 part of sulphate of potash should be worked in before planting at 4oz. per square yard.

"Woolly bear" caterpillars on cinerarias can be controlled by dusting regularly with D.D.T. dust.

Perennials

Once dahlias are cut by frost the blackened tops should be cut back to within 6in. of the ground; any plants known to be severely affected by virus should be lifted and burnt. In districts experiencing heavy frosts the tubers should be lifted and stored in a warm, dry position in a shed or

Trim trees, shrubs, or climbers so that they cannot cause trouble to overhead wires during winter storms.

under a hedge. The position should not be too warm or draughty, as tubers tend to dry out. Where named varieties are grown the names may be written on the tubers with an indelible pencil or labels may be tied on. D.D.T. should be liberally dusted over stored tubers as a protection against slugs, and an occasional inspection of the tubers should be made to make sure they are still plump and healthy. Any rotting tubers should be removed and destroyed.

As soon as plants of chrysanthemum, michaelmas daisy, rudbeckia, and other perennials have finished flowering the tops may be cut away and stakes removed.

The Soil

The soil should be worked up and loosened now before it becomes too wet to handle. Where borders are empty they may be deeply dug. Lighter cultivation should be carried out around shrubs and perennials. Deep digging too close to plants may damage the finer feeding roots and may even work the plant loose in the soil. Loosening the soil now allows the beneficial action of frost and rain to do its work of breaking lumps and improving soil structure.

Now is the time to inspect drains to ensure that water can get away quickly after heavy rain. Plants need oxygen about their roots, and where the ground about them is saturated for weeks at a time they are deprived of air. In extreme cases they may be killed, but it is more likely that waterlogging will cause the tips of shrubs to die and growth to be poor in the following season.

Frost Protection

Shrubs known to be frost tender require protection, especially when they are young and becoming established. Adequate protection should be given, but at the same time the plants should be allowed some light and air, and care should be taken to see that the scrim or sacking used does not touch the plant.

Hardwood cuttings may still be made of hardy deciduous shrubs and hardy hedging materials. Cuttings should be made of healthy vigorous growth about as thick as a pencil and 6in. to 8in. long. The important points to watch are that the basal cut is made cleanly, not jagged or bruised by being cut with a blunt knife, and that the cutting is firmly planted.

Shrubs

In warmer districts shrub planting may be carried out while the ground is warm. Shrubs moved now will root rapidly and have a long period in which to establish before the drought of summer. In wet soil or in colder districts planting in May is not very satisfactory, roots often rotting during winter. In these districts planting is better delayed until spring.

[*Elliott*

Idesia polycarpa

A NATIVE of China and Japan *Idesia polycarpa* is a handsome and rather spreading tree usually about 20ft. high, but it may eventually reach a height of 50ft. The leaves of this tree are large and heart shaped and are borne on reddish stalks. The leaf blade is often 6in. long and 5in. wide or even larger and is generally smooth and bluish beneath. The leaves are tinted in autumn and fall off the tree in winter to allow the bright red fruit to be seen in all its brilliance. The berries are a little larger than currants and are borne in large, pendant panicles and are sought after for florist work. *Idesia polycarpa* is one of the most beautiful and brilliantly coloured of all berry trees; a tree with a prolific crop of berries is a sight not easily forgotten.

The greenish yellow flowers are borne in large terminal panicles and though perfumed are small and unattractive. Male and female flowers are usually borne on separate trees, and it is necessary to have trees of both sexes if it is desired to have berries on the female trees. Reputable nurserymen usually supply plants of known sex and they should be planted in winter. Young trees should be planted in a well-sheltered but sunny position where they will have room to develop and grow into ornamental specimens. *Idesia polycarpa* is fairly hardy and should grow in most parts of New Zealand where winters are not unduly severe. It will do well in a variety of soils, but prefers a loamy soil.

Propagation: Seed may be sown thinly in boxes under glass in spring; germination is usually quite good. When the seedlings are large enough they should be transplanted into sheltered nursery beds. An excellent compost for seed boxes is made up as follows:—

2 parts of good loam (sterilised if possible)

1 part of peat or leafmould

1 part of coarse river sand

All parts are by volume. To each bushel of the mixture ¾oz. of carbonate of lime and 1½oz. of superphosphate should be added.

In warmer districts seed may be sown in the open. Unfortunately there is no way of telling the sex of seedlings until they flower. Plants of known sex may be raised from cuttings or layers. Cuttings should be taken in November or December and should consist of semi-mature shoots with a heel, and should be planted separately in small pots in the same soil mixture as that recommended for seed sowing. River sand should also be placed at the base of each cutting; the pots should then be plunged in sand under glass and bottom heat is usually necessary.

Layering is carried out in spring. The shoots are twisted and pegged down and some river sand placed at the bases of the layers before they are covered with earth; the following spring the layers may be transplanted into a nursery until they are ready for permanent positions.

—F. E. WILKIN, Plant Quarantine Officer,
Department of Agriculture, Wellington

Home Canning

By LESLEY HARDING, formerly Field Officer in Rural Sociology, Department of Agriculture, Auckland

MOST housewives preserve fruit and vegetables when they are plentiful so that there will be a more varied choice during the period when fresh produce is scarce and so that large crops need not be wasted. Meat and fish are often kept for a short time in a refrigerator, but if a large carcass of meat or catch of fish is brought home some may be wasted unless it is preserved. Bottling is a perfectly satisfactory method of preserving many foods, but if a housewife plans to preserve a large quantity of food, a canning machine is a worthwhile investment.

[Sparrow photos

Above and at left—Cans being sealed before processing with different types of canning machine.

THE cost of the canning machine and the cans which must be bought each year will be higher in the long run than the cost of buying jars and tops, but if the machine is used often enough, the convenience of using cans will offset the extra cost.

Cans may be heated or cooled rapidly with no chance of their cracking or breaking as can easily happen with glass jars. During processing cans may safely be stacked in several layers and if necessary a copperful done at once. Cans of food can be stored compactly, as they can safely be stacked one on top of the other. Light cannot affect food preserved in cans as it might with food in badly stored glass jars.

Canning Machines

There are two types of home canning machines on the market in New Zealand at present. Both are used to seal lids on to cans filled with prepared food. An uncapped can is placed on the machine's base plate and is forced into hard contact with the lid of the can under the top plate of the machine. The handle attached to the top plate is then able to revolve the whole can. As the can revolves rollers are forced against its top, the edge of the lid being folded under the lip of the can to form an airtight seal.

In the less expensive of the home-canning machines the sealing rollers are operated by hand pressure; in the other type this movement of the rollers is automatic. Success in using the first type depends on the application of hard, even pressure and the machine is more tiring to operate.

Before either machine is used the instruction booklet should be read thoroughly and followed carefully, because unnecessary failures mean added expense through loss of food and cans.

Lacquered Cans

Cans that are coated on the inside with a thin film of lacquer may be purchased. The coating serves two purposes:—

1. It prevents the acid from fruits from attacking the metal of the can.

2. It prevents sulphur, found in some vegetables and meat, from blackening the metal of the can and the preserved food.

Lacquered cans are slightly more expensive than untreated cans, but their use is recommended for all foods that are to be kept for more than a few months.

Sizes of Cans

The sizes of cans available are A2½, which has a capacity of 1½ pints, and the 1lb. can, which has a capacity of 1 pint. One type of canning machine can seal both sizes, and the other the A2½ only.

Canning Fruit

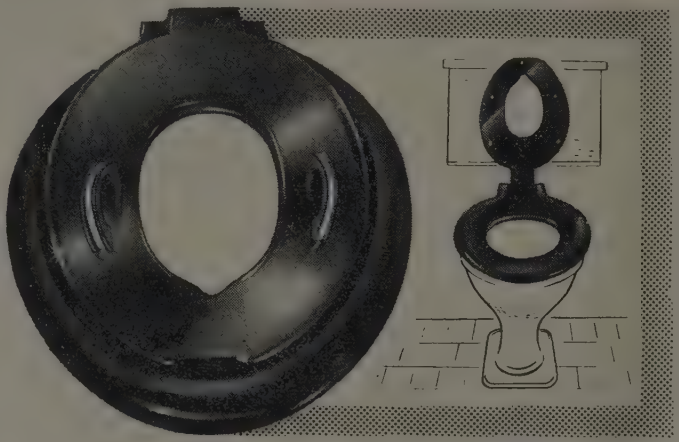
A canning machine with cans and a heavy table or solid bench to screw the machine to are the basic equipment.

Selection and Grading of Fruit

The fruit should be picked dry, and over-ripe or under-ripe pieces should be discarded. Pieces are then sorted into different sizes so that each can may be filled with pieces of uniform size and the same degree of ripeness.

Preparing and Packing

Fruit should be prepared in the ordinary way, peeled if necessary, and cut into suitable sizes.



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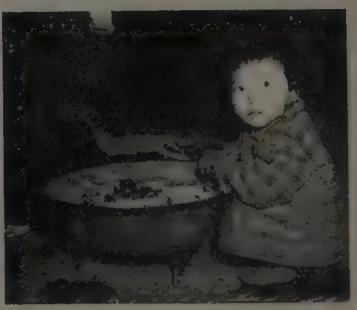

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The cans should be rinsed in cold or hot water to remove dust and should not be dried with a cloth, which might scratch the inside surface, but should be stood upside down to drain. Any dents in the lip of a can should be straightened out so that a perfect seal can be made when the lid is put on.

The fruit is then packed tightly into cans and boiling syrup is poured over the fruit to within ¼in. of the top. The can should then be sealed immediately and is ready for processing. Not more than 6 cans at a time should be filled with syrup before sealing, and steam should still be rising from them, as otherwise the temperature of the contents will have dropped and the containers will have absorbed too much air.

The approximate weights of **prepared** fruits which can be packed into an A2½ can are:—

Fruit	oz.
Apples in syrup	16
Apples pureed	26
Soft fruits	17
Stone fruits	18
Tomatoes whole in brine	16
Tomatoes pureed	27

Syrup

For sour or large fruits a heavy syrup is needed and for small sweet fruits a light syrup. Heavy syrup requires 10lb. of sugar per gallon of water, medium syrup 5lb., and light syrup 3½lb.

When the sugar has dissolved the syrup should be strained and heated until it boils. If the syrup is to be kept hot for long, a lid should be kept on the saucepan to prevent evaporation of the water.

Brine for Tomatoes

The brine needed for canning whole tomatoes is made with 2oz. of salt to a gallon of water.

PROCESSING TIMES FOR CANNED FRUIT

Fruit	Time taken for water to reboil min.	Additional time for cans to be kept in boiling water min.
Apples (in syrup), apricots, blackberries, damsons, gooseberries, grapefruit, greengages, loganberries, oranges, plums (firm-ripe), raspberries, red currants, rhubarb, strawberries	0-5	18-15
	6-10	15-13
	11-15	12-10
	16-20	10-8
*Apples (pureed), black currants, cherries, peaches, pears (ripe dessert), pineapple, plums (underripe)	0-5	22-20
	6-10	20-18
	11-15	17-15
	16-20	15-13
Tomatoes (in brine) ..	0-5	35-32
	6-10	32-30
	11-15	30-27
	16-20	27-25
*Tomatoes (pureed) ..	0-5	45-42
	6-10	42-40
	11-15	40-37
	16-20	37-25

* Pureed apples and tomatoes should be canned while still hot.

Cans of meat being exhausted in simmering water. [*Sparrow*

Processing

Cans of fruit or tomatoes are quite safely processed in a water bath. This should be deep enough for the cans to be covered by about 1in. of water. Some sort of frame should be fitted in the bottom of the water bath so that thorough circulation of boiling water is possible.

The times needed for processing are given in the table at left below.

If during or at the end of processing a leak can be detected, usually by a stream of bubbles issuing from the flaw, it may be stopped if the can is resealed. Otherwise the fruit should be repacked in a new tin and the syrup reboiled.

Processed cans should be cooled to blood heat as quickly as possible by placing them in cold running water. Before the cans are cooled the ends are convex, but as they cool they pop back into their normal position. Cans when cool should be labelled either with pieces of paper large enough to encircle them or with labels stuck on with adhesive tape. They should be stored in a cool, dry place.

If the cans become blown later, the contents should be discarded and not fed to animals.

Oven Processing of Fruit

Oven processing cannot satisfactorily be used for meat and vegetables. If canned fruit is to be oven processed, the filled cans should not be sealed beforehand as they would be for water bath processing, but should be placed in the oven with the lids resting on the tops. The oven should be heated until it reaches 300 degrees F. and maintained at that temperature for an hour. A can should be removed from the oven and if the fruit in the centre is cooked, all the cans should be sealed as soon as possible and cooled in cold running water.

Canning Meat, Poultry, Game, and Fish

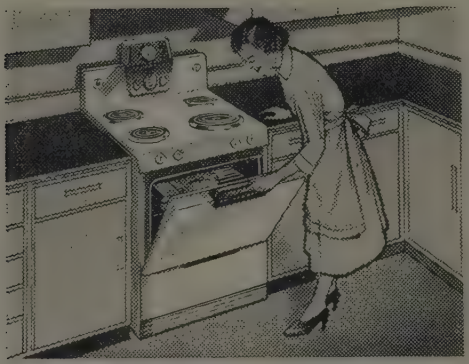
Preparation

Meat: Use fresh meat, choosing cuts commonly used for roasting or stewing. As meat shrinks when it is cooked, pre-cooked meat is more satisfactory to use than raw meat. Cut the meat into suitable pieces and blanch them in boiling water for about 5 minutes. Pack the pieces to within ¾in. of the top of the can and pour in a seasoned gravy made with the blanching water so that it just covers the meat.

Another method is to brown the meat in a pan before packing it and to pour seasoned pan drippings over the pieces.

Vegetables can be added to make a stew.

Poultry and game: The best methods of preparation involve pre-cooking of poultry and game. They are: (a) Wash the pieces, put them in a saucepan with water or stock, add vegetables (onions, carrots, celery, etc.), stew ½ to 1 hour, and then pack into cans. (b) Cut the poultry or game into suitable pieces, dip them in seasoned flour, brown in a little fat, and pack them into a can, pouring gravy over them. Seal the cans.



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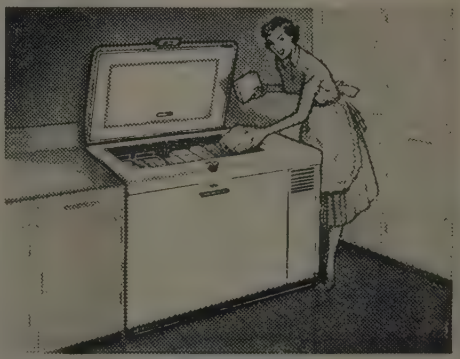

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Fish: Clean the fish and soak it in brine for an hour to remove blood; then wash it thoroughly in fresh water and cut into suitable lengths for packing into the cans after having removed large bones.

If fish is pre-cooked by frying, baking, boiling, or steaming for 5 to 10 minutes, more can be packed into the cans.

Exhausting the Cans

The filled cans should be exhausted by being placed in simmering water and heated for about 15 minutes. They should then be sealed.

Processing

Meat: Pressure cooking is the best method; meat should be processed at 10lb. pressure for 2 hours 15 minutes or at 15lb. pressure for 1 hour 40 minutes.

Poultry and game: The processing times are the same as for meat.

Fish is processed in a pressure cooker at 10lb. pressure for 1½ hours.

If meat or fish is processed in a water bath, the time needed is 4 hours.

Cool, label, and store the cans as for fruit and vegetables.

Canning Vegetables

As vegetable canning is a more complicated and longer process than fruit canning, tasty vegetables and those which are very expensive out of season are usually chosen. Young, tender, and fresh vegetables should be used. Wash them thoroughly before they are peeled or prepared.

Blanching

Before the vegetables are packed into cans they should be blanched or dipped into boiling water which is quickly brought to the boil again. Blanching is important, as it stops the action of enzymes which destroy vitamins, sets the colour of the vegetables, and improves their flavour. Blanching times for individual vegetables vary (see table above).

Packing

The cans should be well filled with vegetables, but they should not be pressed down. Boiling brine made with 2oz. of salt to each gallon of water is tipped over the vegetables to within ½in. of the top of the can. After blanching, the vegetables should be dipped into cold water before being packed.

Exhausting the Cans

To remove as much air as possible from the cans they should be exhausted before being processed. The packed cans are stood in simmering water so that it comes to within 1in. of the tops of the cans and are left for 5 minutes. Cans are then sealed.

Processing

Vegetables are non-acid foods and to kill the heat-resisting bacteria which might cause their decay it is necessary to heat the contents of cans to a high temperature. The safest method is to use a pressure cooker. Vegetables in a water bath must be processed for 3 to 4 hours and then just before use boiled for 15 minutes. A table of processing times is given below.

PROCESSING TIMES FOR VEGETABLES

Vegetable	Blanching time min.	Pressure cooker at 10lb. pressure min.	Water bath hr.
Asparagus	2-3 (in boiling water)	25	3
Broad beans	2-3 (in boiling water)	30	3
French or runner beans	3 (in simmering water)	30	3
Beetroot	10-30 (in boiling water)	30	2
Carrots	10-15 (in boiling water)	30	2
Celery	5 (in boiling water containing ½ teaspoon of citric acid per quart)	25	2½
Mushrooms	5 (in boiling water)	30	3
Peas (fresh)	1-2 (in boiling water)	35	1½

After Processing

Cool the cans in cold running water in the same way as for the fruit cans. Leave the cans in a cool, dry place for a few days and then label and store them.

Some recipes for the canning of individual vegetables are given below.

Asparagus

Only the young and fresh stalks with tightly closed buds should be preserved. Tips of uniform size and maturity should be selected and the inferior stalks discarded. All operations should be carried out as quickly as possible after cutting.

1. Wash the stalks and cut to a height to fit the can.

2. Scrape off the bracts and tie the asparagus in bundles, each bundle containing slightly more stalks than will fit into the can.

3. Stand the bundles tips upward in a wire basket or tie them in muslin and lower them into a pan of boiling water so that the heads are just above the surface. Put on the lids and leave the bundles for 2 to 3 minutes. By this method there is no danger of the heads becoming over-cooked.

4. Remove the asparagus carefully from the boiling water and dip into cold water.

5. Pack the stalks at once into clean cans to within ½in. of the tops, all the tips being placed either at the tops or bottoms of the cans. When packed with the tips downward asparagus is more easily turned out.

6. Fill the cans with hot brine (2oz. to 4oz. of salt to 1 gallon of water) and sterilise in a pressure cooker for 30 minutes at 10lb. pressure.

To serve asparagus: The can should be opened and the can and its contents heated, as in this way the handling of the delicate stalks is avoided. The liquid should then be drained off and the vegetable placed on a piece of toast, to complete the draining, and served with melted butter.

French Beans

1. Wash the beans thoroughly, string if necessary, and cut off the ends. The beans may be packed whole or sliced.

2. Scald the beans in water at simmering point for 3 minutes. Cool in cold water for 1 minute.

3. Pack the beans into cans and cover with hot brine (2oz. to 4oz. of salt to 1 gallon of water).

4. Sterilise in a pressure cooker for 35 minutes at 10lb. pressure.

Beetroot

Beetroot for preserving should be of a deep red variety and uniformly coloured.

1. Remove the tops, taking care not to break the skin, soak the beetroot in a bucket of water until all the soil has been softened, and wash thoroughly until there is no trace of soil left on the beetroot.

2. Place the beetroot in boiling water and boil for 10 to 30 minutes, according to size, or if preferred, cook in a pressure cooker for 10 to 20 minutes or bake in a moderate oven for about 1 hour; then cool the beetroot in cold water and remove the skins.

3. If the roots are small, they can be packed whole, but if large, they should be diced or cut into slices about ¼in. thick.

4. Cover with hot brine (2oz. to 4oz. of salt to 1 gallon of water) and sterilise in a pressure cooker for 35 minutes at 10lb. pressure.

Mushrooms

1. Select sound mushrooms and grade them. Cut off nearly all the stalks.

2. Wash and peel the mushrooms, sprinkle with a little pepper and salt, and put them in a casserole. Stew in a moderate oven until the liquid has been extracted and they are thoroughly hot.

3. Transfer them to cans and cover them with their own juice.

4. Sterilise in a pressure cooker for 30 minutes at 10lb. pressure.

Vegetable Macedoine

Vegetable macedoine is composed of three or four different vegetables such as peas, carrots, turnips, and runner beans. Such mixtures of vegetables are used for soups, stews, and various vegetable garnishes.

1. Prepare the vegetables according to the kind—carrots scraped, peas shelled, etc.

2. Dice the carrots and turnips and slice the runner beans.

3. Scald the different vegetables separately and pack them into the cans in layers to give a bright contrast in colour.

4. Fill the cans with brine (2oz. to 4oz. of salt to 1 gallon of water) and sterilise in a pressure cooker at 10lb. pressure for 40 minutes.

A Long-sleeved Knitted Blouse of Charming Design

THE long-sleeved blouse illustrated is an attractive garment and it should prove to be a welcome addition to a young woman's summer outfit.

ABBREVIATIONS: K., knit; p., purl; st., stitch; inc., increase; dec., decrease; m.st., moss st.; patt., pattern; rep., repeat; cont., continue; beg., beginning; in., inches; m. 1, make 1; sl., slip; p.s.s.o., pass slipped st. over.

The Back

With No. 12 needles cast on 104 st. and work in k. 1., p. 1 rib for 3in.

Next row: Work twice in first st., rib 10, work twice in next st. * rib 2, work twice in next 2 st., rib 3, work twice in next st. Rep. from * to last 10 st. (rib 2, work twice in next st.) twice (rib 1, work twice in next st.) twice. (137 st.)

Change to No. 10 needles and cont. in patt. thus:—

1st row: K. 2, * m. 1, sl. 1, k. 2, p.s.s.o., then k. 2. Rep. from * to end.

2nd row: P. to end.

3rd row: K. 1, * sl. 1, k. 2, p.s.s.o., then k. 2, m. 1. Rep. from * to last st., k. 1.

4th row: P. to end.

These 4 rows form the pattern. Cont. in patt. until work measures 11½in. from cast on edge, ending with a 4th patt. row.

Next row: Cast on 129 st., work 1st patt. row to end.

Next row: Cast on 129 st., p. to the end. Cont. straight in patt. beg. with 3rd patt. row on these 395 st. until work measures 18½in. from cast on edge.

Cast off.

The Front

With No. 12 needles cast on 106 st. and work 3in. in k. 1, p. 1 rib.

Next row: Work twice in first st., rib 2, work twice in next st., * (rib 2, work twice in next st.) twice, rib 3, work twice in next st. Rep. from * to last 2 st., rib 1, work twice in last st. (139 st.)

Change to No. 10 needles.

Now divide for front and work in patt. with m.st. border for left front, thus:—

Next row: Work 1st patt. row across 65 st., turn, and cast on 9 st. for underwrap. Leave remaining st. on a spare needle.

Cont. thus:—

Next row: (K. 1, p. 1) 4 times, k. 1, p. to end.

Next row: Work 3rd patt. row to the last 9 st. (k. 1, p. 1) 4 times, k. 1.

Next row: M.st. 9, p. to end.

Cont. thus until work measures 11½in. from cast on edge, ending with a 4th patt. row.

Next row: Cast on 129 st., work 1st patt. row to the last 9 st., m.st. 9. Cont. straight until work measures 12½in. from cast on edge, ending at front edge.

Shape for Collar

Next row: M.st. 1, work twice in next st., m.st. across remainder of border st., patt. to end.

Work 5 rows without shaping, with 1 st. extra in front border.

Rep. these 6 rows, working all extra st. in m.st. until there are 16 st. in m.st. at front edge, ending with inc. row, then work 5 rows straight. Work should now measure about 16½in. from cast on edge.

Next row: M.st. 1, work twice in next st., m.st. 24 (p. 2 tog., k. 2 tog.) 9 times, m.st. to the end.

Cont. in m.st. across all st. and still inc. 1 st. at front edge in every 6th row as before until there are 11 st. in m.st. extra at front edge, ending at side edge. (196 st. altogether.)

Work should now measure 18½in. from cast on edge.

Next row: Cast off until 20 st. remain, including st. on right-hand needle after casting off, m.st. to the end.

Now shape thus:—

Next row: M.st. 15, turn.

Next row: M.st. to end.

Work 6 rows across all st.

Rep. these 8 rows twice more.

Next row: M.st. 15, turn.

Next row: M.st. to end.

Cast off.

Return to remaining st. on spare needle and with right side of work facing for first row and using No. 10 needles join wool and work thus:—

1st row: (K. 1, p. 1) 4 times, k. 1, work 1st patt. row to the end.

2nd row: P. to the last 9 st., m.st. 9.

Cont. thus in patt. with m.st. front border for 1in., ending at front edge.

Now make a buttonhole thus:—

Next row: M.st. 3, cast off next 3 st., work to end.

Next row: Work to the last 3 st., cast on 3, m.st. 3.

Make 3 more buttonholes in the same way at intervals of 2in. measured from cast off edge of previous buttonhole, without further instructions.

Cont. straight in patt. with front border until work measures 11½in. from cast on edge, ending with a 1st patt. row.

Next row: Cast on 129 st., p. to the last 9 st., m.st. 9.

Now cont. straight until work measures 12½in. from cast on edge, ending at front edge. Shape for collar and complete as given for left front.

Cuffs

Join shoulder and top of sleeve seams. With right side of work facing and using No. 12 needles pick up and k. 112 st. evenly along sleeve edge.

Next row: * k. 2 tog., p. 2 tog. Rep. from * to end. (56 st.)

Next row: * p. 1, k. 1. Rep. from * to end.

Cont. in m.st. until cuff measures 2in. Cast off. Work second cuff in the same way.

Make up

Press work lightly with a hot iron and damp cloth. Join side and undersleeve seams. Sew down cast on edge of underwrap neatly on wrong side. Sew collar extensions along back neck edge and join at centre back. Sew on buttons to match buttonholes. Press seams.

Recipes with Rice

NOW that rice is readily available most housewives are again giving it a permanent place in their store cupboards. As many are doubtless experimenting in rice cookery for the first time, several ways of using this relatively cheap and useful cereal are suggested in this article by Evelyn E. Moore, Field Officer in Rural Sociology, Department of Agriculture, Palmerston North.

RICE, besides being the staple food throughout the lands of the East, is an ingredient of popular dishes in many countries. It is not surprising, therefore, that accepted methods of cooking and serving rice are as varied as the food habits of nations the world over.

Some of these variations in cooking times and methods are due to the different varieties of rice used; others are due to differences in taste. Thus though New Zealanders use rice largely as a dessert, in the East and in Mediterranean countries it is used mainly as an accompaniment to the meat dish, as the main ingredient of a savoury dish, or in soups, meat stuffings, and vegetable dishes.

The varieties at present available in New Zealand are principally Australian, with a little Siamese. The quality of Siamese white rice varies and the rice needs plenty of washing before being cooked. The Australian polished rice available has a better appearance, but has not as high a nutritive value as brown rice, which is almost impossible to obtain.

Most New Zealanders, however, do not eat sufficient rice for the nutritive value of their diet to be significantly affected by eating polished instead of brown rice, and, in fact, it is invariably the other ingredients in rice dishes which are the main sources of vitamins and minerals; the egg and milk in a rice custard for example.

Rice has the advantage of being relatively cheap and is therefore useful as a meat extender in such dishes as rice and meat loaf or as a substitute for bread in poultry stuffing or for potatoes when they are scarce and expensive.

Methods of Cooking Rice

The Chinese and Indians, who are the largest rice consuming nations, have each developed a method of cooking plain rice to produce the soft, grainy texture with the grains remaining separate and not stuck together in a gluey mass, but the success of these methods depends on the quality of rice available. A modified method suitable for the types of rice at present available is as follows:—

1 cup of rice
1 teaspoon of salt
8 cups of boiling water
1 tablespoon of lemon juice (optional, but it whitens the rice)

Wash the rice really well. This washes off the powdery starch stuck

HEADING PHOTOGRAPH: Curry with rice.

to the outsides of the grains. It is this which is largely responsible for rice becoming gluey and sticky. An easy method, taking only a minute, is to place the rice in a saucepan, fill it with cold water, and beat for a few seconds with a rotary beater. Drain off the water and repeat the process once or twice until the water drained off is fairly clear.

Next add the boiling water and salt and boil the rice until it is soft (15 to 25 minutes). Remove the saucepan from the heat, drain off any excess water, and leave the rice to steam dry on the side of the stove for a few moments, shaking it occasionally. Alternatively, the boiled rice can be poured into a serving dish and placed in a slow oven for a few moments. Over-cooking is a frequent cause of rice becoming a solid mass. If this happens, or if the rice is required to be especially white and fluffy, it may be drained, rinsed with boiling water while being shaken or stirred gently with a fork, drained again, piled into a serving dish, and allowed to steam in a slow oven for 10 to 15 minutes or until it is ready to be served.

In Arabia, some of the Mediterranean and South American countries, and the West Indies the general practice is to make the rice dish richer and more savoury by the addition of butter, fried onions, or grated cheese or by cooking it in a meat or chicken stock instead of water. One such recipe is as follows:—

Rice Savoury Style

1 cup of rice	2oz. to 3oz. of butter
4 cups of boiling water or stock	1 small onion finely chopped (optional)

Melt 2 tablespoons of butter in a saucepan and fry the onion. Wash the rice, add it to the onion, and fry for 2 to 3 minutes, mixing thoroughly. Gradually add the boiling water or stock, bring to the boil, and cook rapidly until the rice is tender. Remove from the heat, drain if necessary, mix in the remaining butter, and allow the dish to steam for a few moments in a slow oven or on the side of the stove.

Rice Desserts

Plain Baked Rice Pudding

¼ cup of rice	½ teaspoon of nutmeg
4 cups of milk	1 tablespoon of butter
½ teaspoon of salt	
½ cup of sugar	

(4 to 6 servings)

Wash the rice and combine it with the other ingredients in a buttered baking dish and bake it for 3 hours in a moderately slow oven (325 degrees F.), stirring occasionally to prevent the rice from settling. Do not stir during the last ½ hour of baking. If a richer pudding is desired, stir in 1 or 2 well-beaten eggs ½ hour before the pudding is cooked.

Variations

The plain baked pudding recipe may be varied as follows:—

1. Separate the yolks and whites of 2 or 3 eggs. Beat the yolks and mix into the pudding. Beat the egg whites until stiff and fold in 4 tablespoons of sugar. Spread this meringue on the pudding and bake until it is lightly browned (325 degrees F.).

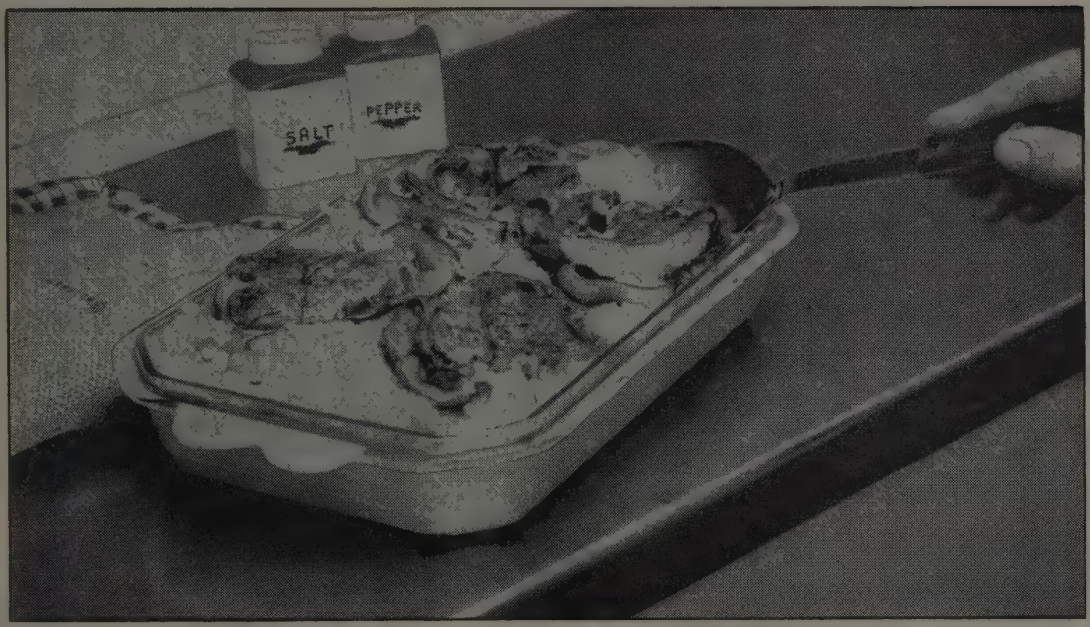
2. Add ½ to 1 cup of seeded raisins, chopped figs, or dates or a mixture of dried fruits.

3. Chocolate rice pudding: Mix 2 tablespoons of cocoa or a chocolate drink mixture with the dry ingredients and add them to the basic recipe.

4. Substitute ½ cup of golden syrup for the sugar and ½ teaspoon of cinnamon for the nutmeg.

5. Add 3 to 5 tablespoons of chopped nuts, 2 tablespoons of coconut, and ⅓ cup of sultanas.

Rice cream with butterscotch nut sauce.



Basting meat in a dish of meat, rice, and vegetables cooked in a casserole.

Rice Custard

2 cups of cooked rice
2 cups of milk
½ teaspoon of salt
¼ teaspoon of nutmeg (optional)
1 or 2 eggs
¼ cup of sugar
1 tablespoon of melted butter
1 teaspoon of vanilla

(4 to 6 servings)

Mix and beat well the milk, eggs, butter, sugar, vanilla, nutmeg, and salt. Mix in the cooked rice, pour into a baking dish, set in a pan of hot water, and bake at 350 degrees F. for 1 hour or until a knife inserted in the centre of the custard comes out clean.

Date, Nut, and Raisin Custard

Add ¼ cup of chopped dates, ¼ cup of chopped nuts, and ¼ cup of raisins to the rice custard mixture before baking.

Pineapple Rice Pudding

¾ cup of crushed pineapple (drained)
2 tablespoons of lemon juice
½ cup of shredded coconut
¼ cup of sugar
2 cups of cold cooked rice
1 cup of whipped cream or thick custard sauce

(4 to 6 servings)

Mix the pineapple, lemon juice, sugar, and salt. Fold the mixture into the cream or custard. Fold in the rice and coconut. Chill in a safe or refrigerator before serving.

Rice Cream with Butterscotch Nut Sauce

2 tablespoons of gelatine
¼ cup of cold water
1 cup of whipped cream
2 cups of milk
¼ cup of butter
1 cup of brown sugar
1 cup of cooked rice
1 teaspoon of vanilla

(4 to 6 servings)

Soak the gelatine in the ¼ cup of cold water. Melt the butter in a saucepan and stir in the brown sugar. Cook slowly until well blended, add the milk, and cook until the sugar is thoroughly dissolved. Add the gelatine soaked in cold water and stir until it is dissolved. Cool it, and when it begins to set fold in the cooked rice and cream. Flavour with vanilla. Pour into a wet mould and stand it in a cool place to set. Serve with butterscotch nut sauce.

Butterscotch Nut Sauce

2 cups of brown sugar
2 tablespoons of flour
1 teaspoon of vanilla
2oz. of butter
2 cups of cold water
1 cup of salted nuts (chopped)

Mix the brown sugar, flour, butter, and cold water in a saucepan. Cook until a thick syrup is obtained, flavour with vanilla, add the chopped nuts, and stand the mixture aside to cool before serving.

Fruit and Rice Fluff

1 large tin or 2 cups of preserved or stewed fruit (use apricots, peaches, or other fruit) drained
2 cups of cooked rice
½ cup of fruit syrup
¼ teaspoon of lemon rind
1 teaspoon of lemon juice
1 tablespoon of butter

(4 servings)

Add fruit, syrup, and lemon juice and peel to the cooked rice. Bring to the boil and simmer gently for 5 minutes. Add the butter and allow the mixture to stand for 10 minutes. Turn it into a serving dish or mould and chill. Serve plain or with whipped cream.

Savoury Rice Dishes

Curry and Rice

4 cups of chopped cooked meat (lamb, mutton, fowl, or veal) or fish
2 or 3 medium onions peeled and sliced
2 medium tart apples peeled and sliced
2 or 3 stalks of celery chopped (optional)
4 tablespoons of butter or other fat
4 tablespoons of flour
1 to 4 teaspoons (according to taste) of curry powder
1 teaspoon of salt
½ teaspoon of pepper
¼ cup of seedless raisins
1 tablespoon of tomato sauce, 1 teaspoon of Worcester sauce, or juice of ½ lemon
2 cups of meat or vegetable stock or water
2 to 3 cups of cooked rice

(6 servings)

If uncooked meat is to be used, stew it gently in water with 3 or 4 peppercorns and sprigs of thyme and parsley. When it is tender strain off the stock.

Melt the fat in a large saucepan, add the apple, onion, and celery, and fry until they are tender and lightly browned. Mix flour, curry powder, salt, and pepper and blend them into the mixture. Then add the two cups of stock gradually. Bring to the boil, stirring continuously, and add the remaining ingredients. Simmer gently for 10 to 15 minutes or until all the vegetables are tender. Serve with cooked rice and peas.

Meat with Rice and Vegetables

4 large onions sliced
4 large potatoes sliced
2lb. of tomatoes sliced
3 cups of tomato juice, stock, or water
2 tablespoons of fat
1 cup of rice
4 lamb, mutton, or pork chops (fat trimmed off)
1 teaspoon of salt
¼ teaspoon of pepper

(4 servings)

Try these Tested Recipes from Edmonds—

CRUSHED PINEAPPLE BLANCMANGE

1 breakfast cup milk. *1 egg.*
1 heaped tablespoon EDMONDS CORNFLOUR.
2 tablespoons sugar.
1 breakfast cup crushed (drained) pineapple.

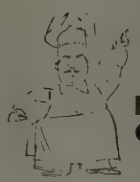
METHOD: Mix cornflour and sugar with a little extra cold milk and egg yolk. Heat milk and pour on to mixture, then return to saucepan and cook for five minutes after the mixture thickens. Lastly add pineapple and stiffly-beaten egg white. Set in a wet mould.

and be sure of success - always

EDMONDS HOME-MADE LOAF

4 cups flour
1 teaspoon salt
Small cold boiled potato
Milk, or milk and water
2 raised teaspoons **Edmonds Baking Powder** (Sure-to-Rise or Acto)
½ teaspoon sugar

Sift together flour, sugar, salt and baking powder, then rub in the potato. Add sufficient liquid (about a pint) to make a soft and smooth dough. Mix quickly, put at once into a greased tin ⅔ full, smooth top with a knife dipped in melted butter, and bake immediately about ¾ to 1 hour in a hot oven (400 deg. F.). Cover over with paper for first 10 or 15 minutes to prevent crusting too soon. When done, take from tin and wrap in a bread cloth until cold.



EDMONDS GOLDEN CAP PUDDING

½ cup treacle or Golden Syrup
4 tablespoons butter
4 tablespoons sugar
2 eggs
Milk (enough to make a stiff batter)
4 tablespoons flour,
1 heaped teaspoon **Edmonds Baking Powder**
A pinch of salt
Few drops essence of lemon or vanilla

Butter a basin, pour into it golden syrup. Into another basin put butter and sugar and beat to a cream. Stir in beaten eggs, add flour, baking powder and salt mixed, then essence, and lastly milk. Pour mixture carefully on top of treacle; do not stir. Steam 1½ hours. Serve with treacle sauce. Apricot jam may be used instead of syrup. Serve with **Edmonds Custard.**

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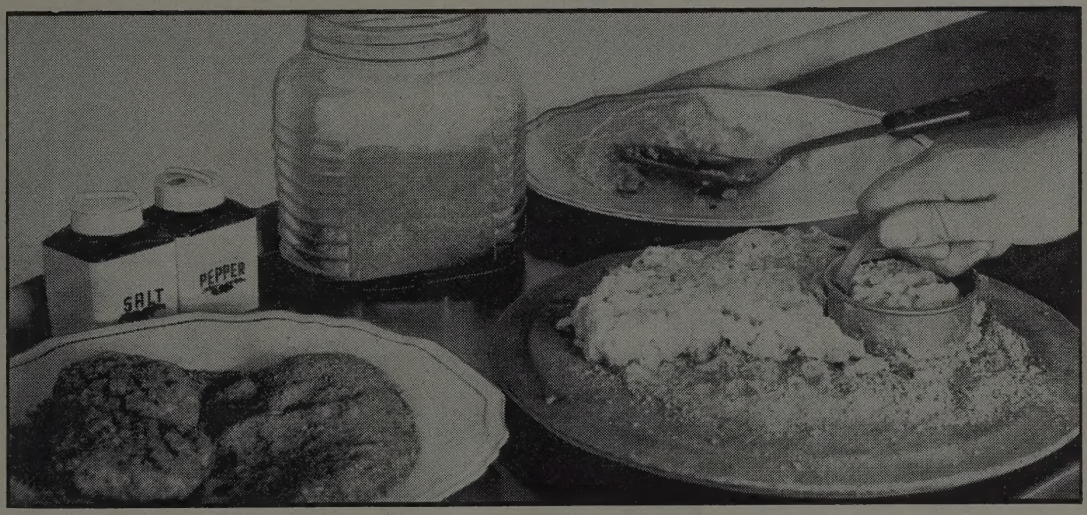

Preparation of rice and corn patties. After being dipped in dried breadcrumbs the patties are fried in a small quantity of hot fat.

Brown the onions in the fat and place half of them in a greased baking dish or casserole. Put the potatoes, half the tomatoes, and the rest of the onions in layers on top in that order. Wash the rice, drain it, and place it on top of the onions. Add the remaining tomato slices and pour the tomato juice over the top. Slightly brown the chops, sprinkle with the salt and pepper, place on top of the vegetables and rice in the casserole, cover, and bake in a moderate oven (325 to 350 degrees F.) for 45 to 50 minutes. Then baste the chops and leave the baking dish uncovered. Continue baking until the chops are lightly browned on top and all the vegetables are tender. Serve hot as the main dish of a meal.

Turkish Pilaf

Turkish pilaf is a similar dish to the last mentioned and may be served when tomatoes are out of season. It may be cooked on top of the stove when the oven is in use.

- 1½ to 2lb. of mutton or lamb chops (neck chops may be used with all fat trimmed off)
- ½lb. of sliced bacon
- 1½lb. of sliced onions
- 6oz. (¾ cup) of rice
- 5 cups of meat stock or water
- 4 teaspoons of salt (if water or unseasoned stock is used)

(6 servings)

Spread the slices of bacon in the bottom of a heavy saucepan with a tight-fitting lid. Add the remaining ingredients in layers in the following order: Half the neck chops, the onion, half the rice, the remaining meat, and the remaining rice. Season these, pour over the stock or water, cover tightly, bring to the boil, and simmer gently until tender (2 hours).

Rice and Corn Patties

- 1 small tin or 1½ cups of cooked sweet corn
- 2 cups of cooked rice
- 2 teaspoons of grated onion
- 1 teaspoon of salt
- 2 teaspoons of chopped chives
- ¼ teaspoon of pepper
- 1 slightly beaten egg
- ½ cup of fine dried breadcrumbs

(These quantities make about 8 patties)

Mix the corn, rice, onion, chives, salt, and pepper together. Add the egg and mix well. Chill the mixture in a refrigerator or safe for an hour and then shape it into patties. Roll it in breadcrumbs and fry in a small amount of hot fat until golden brown.

Rice and Meat Loaf

- 1 medium onion chopped
- ¾ cup of cooked rice
- 1½lb. of mince or 1¼lb. of mince and ¼lb. of minced bacon
- 1 beaten egg
- ¾ cup of milk
- ¼ teaspoon of pepper
- ½ teaspoon of salt
- ½ teaspoon of celery salt
- 1 to 2 teaspoons of Worcester sauce (optional)

Topping

- ½ cup of brown sugar
- ¼ cup of vinegar
- 1 tablespoon of mustard

(6 servings)

Mix the onion, rice, and meat together, beat the egg and milk, and add them with the seasoning to the meat. This makes a soft mixture. Put it into a well-greased loaf pan and pat it down so that the top is even. Mix the sugar, vinegar, and mustard together, pour them over the loaf, and bake it for 1½ hours at 250-300 degrees F. More rice and less meat may be used if desired.

Rice with Chicken and Ham

- 2 tablespoons of fat
- 2 onions sliced
- 2 cloves of garlic minced finely (optional)
- 1 cup of chopped green peppers (optional)
- 2 cups of diced cooked fowl and ham
- 1lb. of cooked pork sausages cut in rounds
- Sprig of thyme
- 1 quart jar of bottled tomatoes or 2lb. of tomatoes
- 1 cup of rice (uncooked)
- 2½ cups of chicken broth, stock, or water
- 1 tablespoon of chopped parsley
- 1½ teaspoons of salt
- ⅛ teaspoon of chilli powder
- ¼ teaspoon of pepper

Melt the fat in a large saucepan, add the onion, garlic, and green peppers, and cook slowly until the onions and green peppers are tender. Add the cooked meats and cook for 5 minutes. Add the tomatoes, uncooked rice, and other ingredients. Place in a large greased casserole, cover, and bake in the oven at 350 degrees F. for 50 minutes or until the rice is cooked and the liquid absorbed.

Baked Onions and Rice

- 6 to 8 onions sliced and cooked
- 4 tablespoons of butter
- 4 tablespoons of flour
- Pinch of pepper
- 1 teaspoon of salt
- 2 cups of milk
- ¾ cup of grated cheese
- 2 cups of cooked rice

(4 to 6 servings)

Make a white sauce using the flour, butter, milk, and seasonings. Add the grated cheese when the sauce is thick and stir until the cheese is melted. Place in a buttered dish alternate layers of cooked rice, onions, and cheese sauce. Cover with buttered breadcrumbs and bake in a moderate oven (350 degrees F.) until golden brown (20 minutes).

Tomato and Rice Pie

- 2 cups of cooked rice
- 3 cups of blanched, peeled, chopped tomatoes
- 1 teaspoon of celery salt
- ½ teaspoon of pepper
- ¼ teaspoon of chopped thyme or dried mixed herbs
- 2 tablespoons of chopped chives

(4 to 6 servings)

Place alternate layers of rice and chopped tomatoes mixed with the seasonings in a baking dish. Cover with soft buttered breadcrumbs. (1 cup of breadcrumbs and 2 teaspoons of melted butter) and bake in a moderate oven (350 to 375 degrees F.) for ½ hour.

Rice and Cheese Souffle

- 1 cup of cooked rice
- 2 tablespoons of butter
- 3 tablespoons of flour
- ¾ cup of milk
- 4 eggs
- ½ teaspoon of salt
- ¼ teaspoon of pepper
- ½lb. of processed cheese

(5 servings)

Melt the butter, add the flour, salt, and pepper, and stir until the mixture is smooth. Add the milk and cook

the mixture until it is thick. Slice the cheese thinly and add it to the sauce, stirring occasionally until the cheese is melted. Separate the egg whites and yolks, beat the yolks slightly, and add them slowly to the cheese mixture, stirring constantly. Then remove the mixture from the heat. Fold the cup of cooked rice into the cheese mixture. Beat the egg whites until they are stiff and fold the cheese and rice mixture into them gently, adding it slowly. Pour the mixture into a casserole or pie dish and bake in the centre of the oven at 325 degrees F. for 40 minutes.

Rice Soups

Rice in Vegetable Soups

Add uncooked rice to vegetable soups 20 to 25 minutes before the end of the cooking period.

Chicken Rice Soup

1 cup of rice
8 cups of chicken stock
2 carrots, 2 white turnips, 2 tomatoes, and 2 onions all finely chopped
2 cups of chopped meat from a boiling fowl cooked until it is tender
1 to 2 teaspoons of salt
⅛ teaspoon of pepper

(6 to 8 servings)

Bring the stock to the boil and add the washed rice and vegetables. Cook slowly until all the ingredients are soft. Add the tender chicken pieces and salt and pepper; the amount of seasoning will depend on whether the stock has been seasoned. Cook the mixture a little longer and serve.

Tomato and Rice Soup

¼ cup of rice
2 cups of cooked tomato puree or 4 large ripe tomatoes blanched, peeled, and chopped
5 cups of meat or vegetable stock
1 teaspoon of salt
⅛ teaspoon of pepper
1 tablespoon of finely chopped parsley

(5 servings)

Wash the rice and add it to the hot stock. Add the tomatoes and seasoning and cook until the rice is tender. Before serving add the parsley.

All photographs by Embassy Studios.

Dolman-sleeved Pullover in Boucle Wool

A SIMPLE pattern for knitting a dolman-sleeved pullover in boucle wool is given in this article. The pullover is knitted in one piece, with the "purl" side of the stocking stitch outward. The instructions are for a garment having a 34in. bust measurement and 20in. length.

MATERIALS required are 13oz. of boucle wool and 1 pair of No. 10 and 1 pair and 1 set of 4 No. 12 needles. Tension is 7 stitches and 10 rows to 1in. over stocking stitch on No. 10 needles.

Abbreviations used are: K., knit; p., purl; st. st., stocking stitch (1 row k., 1 row p.); st., stitch(es); tog., together; dec., decrease; inc., increase; patt., pattern; beg., beginning; rep., repeat; m. 1, make 1 (by bringing wool forward).

Front

With No. 12 needles cast on 98 st. and work in k. 1, p. 1 rib for 1in.; inc. 1 st. at each end of last row. First row: K. 16, * p. 3, k. 2, rep. from * to last 14 st., k. 14. Second row: P. 14, k. 1, p. 1, * k. 2 tog., m. 1, k. 1, p. 2, rep. from * to last 15 st., k. 1, p. 14. Third row: K. 16, * p. 2 tog., m. 1, p. 1, k. 2, rep. from * to last 14 st., k. 14. These last 2 rows form the patt. Cont. in patt. until work measures 4in. Change to No. 10 needles and work 10 more rows in patt. Now, keeping continuity of patt., inc. 1 st. at each end of next and every following fourth row (working extra st. in st. st.) until there are 120 st. Work 3 rows.

Shaping the sleeves: Next row: Cast on 2 st., work to last st., k. twice into last st. Rep. this row until there are 234 st.

Next row: Cast on 2 st., work to end. Rep. this row until there are 288 st. Work ½in., keeping continuity of patt. at centre 72 st. and all other st. in st. st. Finish with a row on the right side.

Shaping the shoulders: Next row: K. 57, inc. (by k. twice into next st.) (k. 24, inc.) twice patt. 72 (inc. k. 24) twice inc. k. 57. Work 3 rows in patt. and st. st. without shaping.

Next row: K. 58, inc. (k. 25, inc.) twice patt. 72 (inc. k. 25) twice inc. k. 58. Work 3 rows in patt. and st. st. without shaping.

Next row: K. 59, inc. (k. 26, inc.) twice patt. 72 (inc. k. 26) twice inc. k. 59. Work 3 rows in patt. and st. st. without shaping.

Next row: K. 60, inc. (k. 27, inc.) twice patt. 72 (inc. k. 27) twice inc. k. 60. Work 1 row (312 st.).

Shaping the neck: Work 152 st., cast off 8 st., work to end. Keeping the continuity of the patt. and st. st., work on this second set of 152 st. First row: Work to last 2 st. work 2 tog. Second row: K. 2 tog., patt. 29 (inc. k. 28) twice inc. k. 61. Third row: As for first row. Fourth row: K. 2 tog., work to end. Fifth row: As for first row. Sixth row: K. 2 tog., patt. 25 (inc. k. 29) twice inc. k. 62. Seventh row: As for first row. Eighth row: As for fourth row. Ninth row: As for first row. Tenth row: K. 2 tog., patt. 21 (inc. k. 30) twice inc. k. 63 (151). Now continue in st. st. and patt. until work measures 20½in. ending at neck edge.

Back neck shaping: Inc. 1 st. at neck edge of next 4 rows. Leave these st. on a spare needle.

Return to remaining 152 st. at front neck, rejoin wool at neck edge, and work thus:—

First row: Work 2 tog., work to end. Second row: K. 61 (inc. k. 28) twice inc. patt. 29, k. 2 tog. Third row: As for first row. Fourth row: Work to last 2 st. work 2 tog. Fifth row: As for first row. Sixth row: K. 62 (inc. k. 29) twice inc. patt. 25, k. 2 tog. Seventh row: As for first row. Eighth row: As for fourth row. Ninth row: As for first row. Tenth row: K. 63 (inc. k. 30), twice inc. patt. 21, k. 2 tog. Now continue in st. st. and patt. without shaping until work measures 20½in. ending at neck edge.

Back neck shaping: Inc. 1 st. at neck edge of next 4 rows. Cast on 20 st. at neck edge; now work across st. on spare needle, thus assembling 330 st. on 1 needle. Next row: Work to end.

Shoulder shaping: Next row: K. 63 (k. 2 tog., k. 30) twice k. 2 tog., patt. 72, k. 2 tog. (k. 30, k. 2 tog.) twice k. 63. Work 3 rows without shaping.

Next row: K. 62 (k. 2 tog., k. 29) twice k. 2 tog., patt. 72, k. 2 tog. (k. 29, k. 2 tog.) twice k. 62.

Work 3 rows in st.st. and patt. without shaping.

Next row: K. 61 (k. 2 tog., k. 28) twice k. 2 tog., patt. 72, k. 2 tog. (k. 28, k. 2 tog.) twice k. 61.

Work 3 rows in st. st. and patt. without shaping. Continue thus dec. 6 st. every fourth row, keeping 72 st. in centre patt. and working 1 st. less between decreasings and at side edge until 288 st. remain. Work ½in. in st. st. and patt. without shaping, finishing with a row on the wrong side.

Shaping the sleeves: Next row: Cast off 2 st.; work to end. Rep. this row until there are 234 st.

Next row: Cast off 2 st., work to last 2 st., work 2 st. tog. Rep. this row until there are 120 st.

Work 3 rows. Now dec. 1 st. at each end of next and every following fourth row until 100 st. remain. Work 10 rows.

Change to No. 12 needles. Work 3in. in st. st. and patt. Work 1in. in k. 1, p. 1 rib. Cast off loosely in rib.

Cuffs

Using No. 12 needles and with right side of work facing, pick up and k. 62 st. along the lower edge of the sleeve; then p. 1 row. Now work in patt. for 2in. Work in k. 1, p. 1 rib for 1in. Cast off loosely in rib.

Neckband

Using 4 No. 12 needles and with right side of work facing, pick up and k. 104 st. and work in k. 1, p. 1 rib for 1in. Cast off loosely in rib.

Making up

Press the work lightly, using a hot iron and damp cloth. Join side and sleeve seams. Press all seams.

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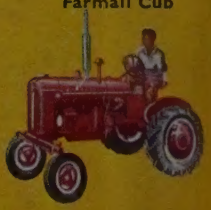

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